the OIL AND GAS JOURNAL
PUBLISHED WEEKLY FEBRUARY 15, 1960

Did Government prove conspiracy? ▸ 55

Machine makes pipe on right-of-way ▸ 60

Friend or foe? Coal doesn't know ▸ 62

A Mexican geologist looks at
Mexico's Isthmus of Tehuantepec ▸ 159

How to Speed UNITIZATION

Management can help if it will . . .

- Follow expert advice
- Send informed delegates
- Give delegates authority

p. 83

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OIL AND GAS JOURNAL
Vol. 58 No. 7

Contents February 15, 1960

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Annual index available on request.

TECHNOLOGY—OPERATION

SPECIAL PRODUCTION REPORT: How To Unitize Faster 83-98

By Marshall W. Myers

A comprehensive treatment of the actual procedures to be followed in the formation of a unit for the production of oil and gas. That unitization is important is best shown by the fact that there were 756 unitized projects in operation on January 1, 1959, compared to 92 such projects in 1952. And the number is growing every day. Also, unitized production is responsible for most of the oil produced from secondary-recovery and pressure-maintenance operations. The activities of management and the several committees and subcommittees normally taking part in the unitization effort are included.

Drilling

New Weight Indicator Gives Hook Load 100

By W. B. Bleakley and Robert J. Enright

Operating on an entirely new principle, a new weight indicator has been designed to eliminate costly accidents caused by too much pull on a pulling unit. The hydraulic unit is simply constructed and discussed for use on a single-pole servicing unit, double-pole unit, or a portable derrick. It operates under derrick legs, with indicator in full view of the driller. Even wind load on the mast is shown. Gage can be placed in any position convenient to the operator.

Refining-Processing

BP's Cat Crackers Get Feed Free of Metal Contamination 107

By Robert J. Hood

Vacuum distillation and propane decarbonizing are used at Montreal. Moose Jaw uses vacuum distillation and delayed coking. The Edmonton plant uses delayed coking in conjunction with a combination with a topping-thermal cracking unit. The Clarkson plant uses propane deasphalting.

Pipelining

How Panhandle Eastern Combated Five Common Cooling Water Problems 116

By J. T. Russell

Part 2 of two parts. Where water is to be treated for several closely grouped cooling systems, a cascade arrangement of makeup water is usually advantageous. The company revised 26 of 32 natural-draft towers to spray type, resulting in nearly $800,000 savings in investment.

On The Job . . . Pipelining 122

A 1-year test program has shown the usefulness of the analysis of engine lubricating oil in detecting excessive component wear well in advance of engine breakdown. Recent tests show the best way of using cathodic protection in high-resistivity soil. Current required for protection is approximately three times the magnitude of the corrosion current.

The OIL AND GAS JOURNAL Newsletter

Tulsa, Okla.
Feb. 15, 1960

IPAA is taking its program to the industry grass roots:

In a series of meetings in the oil country, the touring IPAA executives talked over these plans on:

...Economics. An economic study group is being formed to analyze all factors affecting the oil economy and make recommendations for improvement. The oil industry isn't sharing the U. S. prosperity and is being liquidated by current low prices.

...Politics. The industry needs a consistent story to tell Congress and the Government on imports control, natural-gas regulation, and depletion allowance. The strategy here is never let up.

...Public relations. The program is aimed at industry-connected people, not the man in the street. The people needing cultivation are industry employes, congressmen, government officials, stockholders, royalty owners, and land owners.

▼ ▼ ▼

Oil-company lawyers are confident about the outcome of the price conspiracy case (p. 55).*

They feel even if judge turns down their motions for acquittal, they can put up a strong defense to disprove the government charges.

▼ ▼ ▼

Showdown on percentage depletion for foreign operations may be shaping up in Congress.

Rep. John Dingell (D-Mich) has put a bill in the hopper which would eliminate the tax provision for overseas production by U. S. oil firms.

In the Senate, leaders of a "liberal" Democratic faction are expected to raise the issue at a meeting this week of Senate party members called to discuss party policy.

Dingell's bill is the first to call for outright repeal

---

*Refers to article in this issue giving more details. Where no page is given, the item is a Newsletter exclusive.

of overseas percentage depletion. He is also asking for a graduated reduction of domestic depletion, but his bill on this point is similar to others introduced earlier.

The proposal to permit an increase in unfinished oil imports into District 5 is dead.

Getting only adverse reaction to the proposed rule, Interior Department is withdrawing it. The announcement is expected momentarily.

Your company's employment policies may require revision in the years immediately ahead. Reason: The change in the nation's manpower picture.

The number of younger workers will increase as the bumper crop of postwar babies hits the labor market.

There will be fewer middle-aged workers, relatively, because of the low birth rate during the depression years.

There will be more older workers, because of increased life expectancy.

Net result: Companies will find it necessary to hire more younger and more older employees.

▼ ▼ ▼

Some drilling bright spots:

Activity in western Canada is at a 33-month peak, thanks to a surge of drilling in British Columbia and Northwest Territories. There are 266 rigs active in the West.

The American Rockies will set a new drilling record this year if January activity keeps up. Operators completed 365 wells in the month, 58 more than for same period last year. Of the 137 wildcats drilled, 17 found new oil pools and 7 new gas fields.

Pure is keeping silent on its 2 Northwest Lisbon in San Juan County, Utah. It is about 1¼ mile southeast of discovery well which brought the first Devonian production to Utah.

Sunray's 1 Bollaert may open a new Niagaran reef oil pool in St. Clair County, Mich. It flowed oil at rate of 8 bbl. an hour on test of perforation at 3,825 ft.

Oil-country steel business has been quiet so far in 1960, steel industry sources report.

Majors haven't felt need to rebuild stocks...Demand for 4½ to 5½-in. sizes is good and supply is tight...Larger sizes are readily available...Drill pipe business is slack until drilling makes its spring upturn.

▼ ▼ ▼

Continuous pipe-making machine is being used on lines laid in Europe and Africa. It or a similar model may be answer to pipeliners dream.

The machine will produce spiral, double-welded pipe

on the right-of-way. It will make pipe of several sizes and can be mounted on a trailer (p. 60).

Large diameter natural-gas line of asbestos-cement pipe has proved itself in Russian experiments.

The 9-mile link has now been placed in service in oil fields in Bashkir Republic.

Liquefied methane is reported under investigation by Southern California Edison as another means of obtaining an independent gas supply for its power plants.

Edison, now looking at Venezuela for gas to liquify, has been considering buying gas in Louisiana and Texas for a pipeline to California.

▼ ▼ ▼

Oil labor unions did all right on wages last year.

Analysis by Bureau of National Affairs shows oil refinery unions gained an average of 13 cents an hour while average union increase was just under 9 cents.

OCAW is setting up new program for collective bargaining in the oil industry.

Regional conferences will be held early next month to discuss bargaining goals and exchange ideas with national officers. Delegates also will be elected to the national bargaining policy committee which then will have the job of drawing up a coordinated bargaining program for the industry.

Talks between oil firms in Venezuela and the workers union are making some headway.

Fifty-six clauses of a new contract have been approved. But the key issues are yet to be resolved.

The negotiations are private with no government officials present.

Creole is paying $9 per month per engineer for temporary permits for about 450 men on its staff.

The assessment is being levied by the College of Engineers, an organization empowered by Venezuelan law to regulate the practice of professional engineering.

Creole's bill for 1959 and 1960 will total nearly $100,000.

▼ ▼ ▼

Rapeseed oil is being proposed as a lube additive.

Saskatchewan's research council reports replacement of 10% of mineral oil with rapeseed oil will cut down on both cylinder and piston wear.

Council reports rapeseed oil is a pour-point depressant,

improves viscosity index, possesses detergent properties, and acts as an oiliness agent.

Historic 2-cent differential between gasoline prices of major and non-major service stations may grow narrower.

Private-brand superstations at prime locations today do enormous volume at "2 cents under" and the quality of their products and service is acceptable to the public. The differential became established when non-majors had mainly side-street locations, did no advertising, gave very little service.

Rapid growth of private-brand stations is obvious evidence the differential is too high, and major executives now feel they may have to drop it to 1 cent.

This may not be enough to cover majors' expense of advertising, special additives, dealer training, refinery research, product improvement, credit cards, etc., but they may have to be satisfied with it.

Narrowing the differential will mean violent protests from private branders, could trigger bitter price wars.

One major, checking its position in current controversy over excessive-versus-desirable products stocks, analyzed its midwinter inventories and got this breakdown:

Gasoline stocks totaled about 3,000,000 bbl. But about 32% was tank bottoms and material in process, 18% minimum working stocks, 12% in transit, and 36% available for sale or the equivalent of 13 days' supply.

Distillate stocks were about 3,500,000 bbl., 16% tank bottoms or in process, 8% minimum working stocks, 9% in transit, and 66% available for sale or about 66 days' supply.

▼ ▼ ▼

Notes from abroad:

Five groups of companies have been granted the first concessions in the Spanish Sahara, on the west coast of North Africa. First grants cover about 11 million acres in 18 different tracts (p. 78)...Venezuela may be in the oil exploration and producing business soon. Minister of Mines Perez Alfonzo has polished off his plans for a national oil company and presented them to National Energy Council, an advisory board. However, Perez Alfonzo says government-owned company will not interfere with private-company operations in Venezuela. National oil company long has been dream of Perez Alfonzo and President Bentacourt (p. 79).

Upcoming: Alaska's second offshore oil and gas lease sale in Anchorage in midyear—nominations are being taken... Energy Institute in Washington June 27-July 1 to take long look at the world energy picture and role of each source. The sponsor is American University...National Petroleum Council meets on March 22 in Washington...

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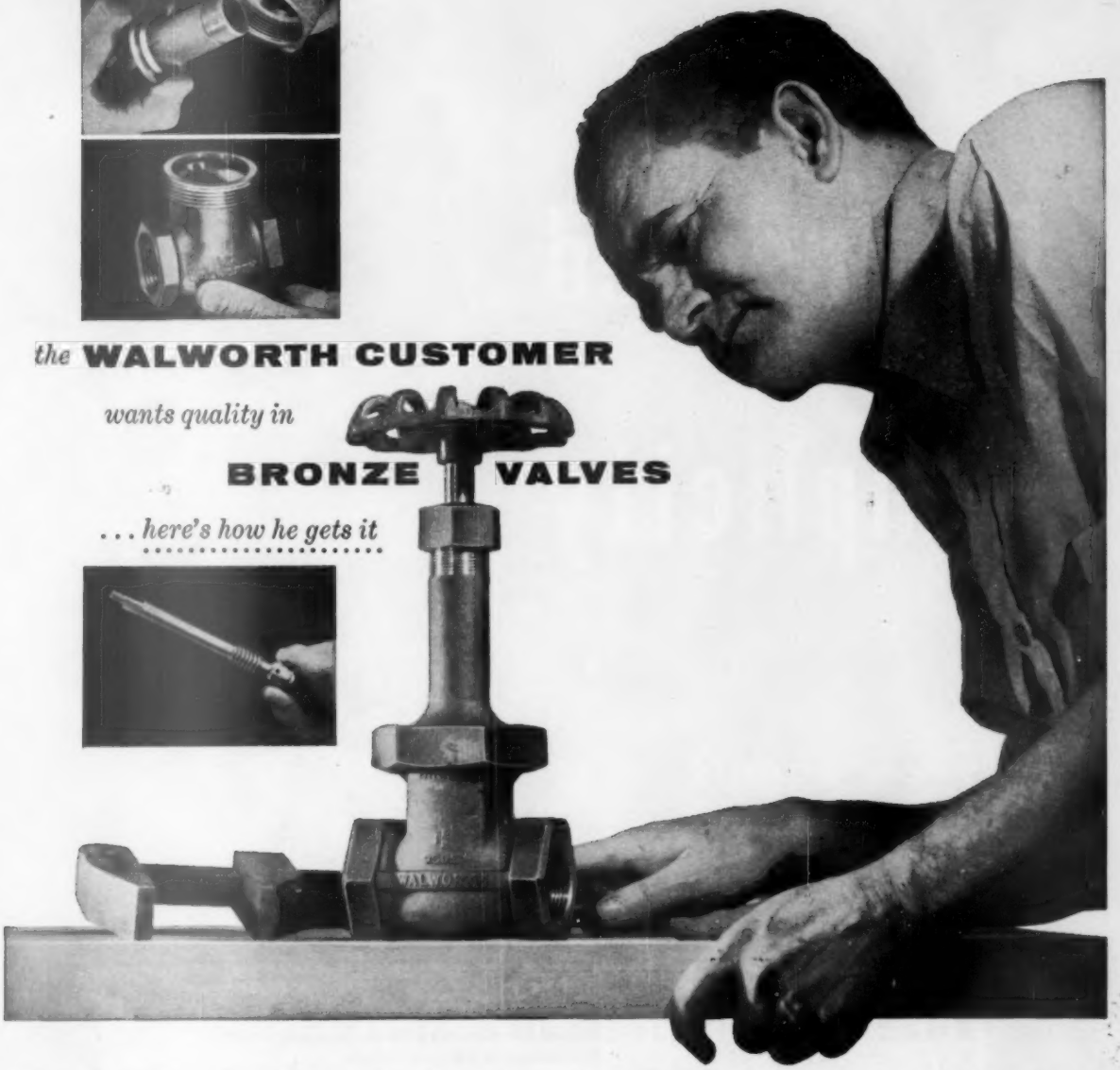

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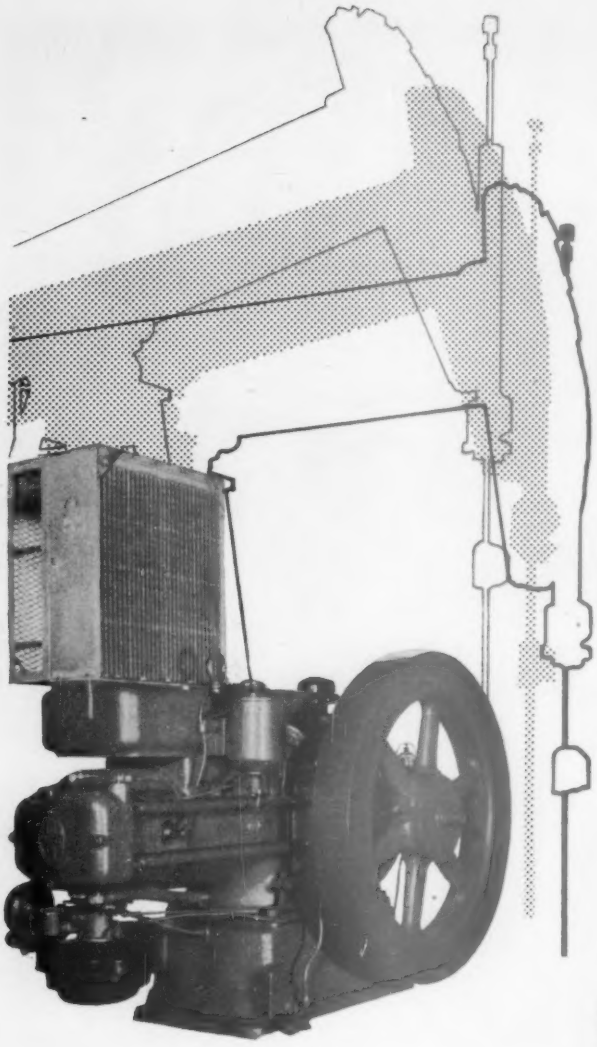

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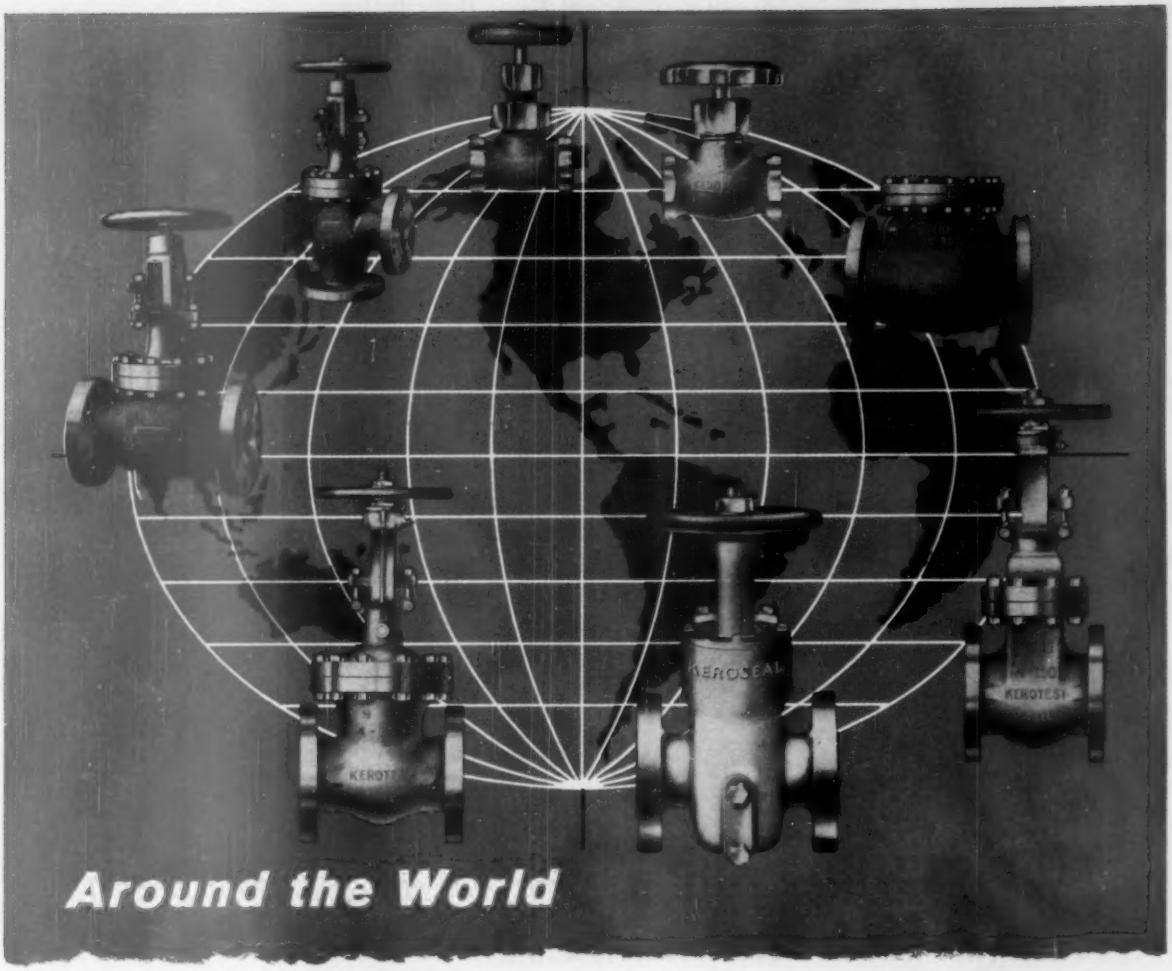

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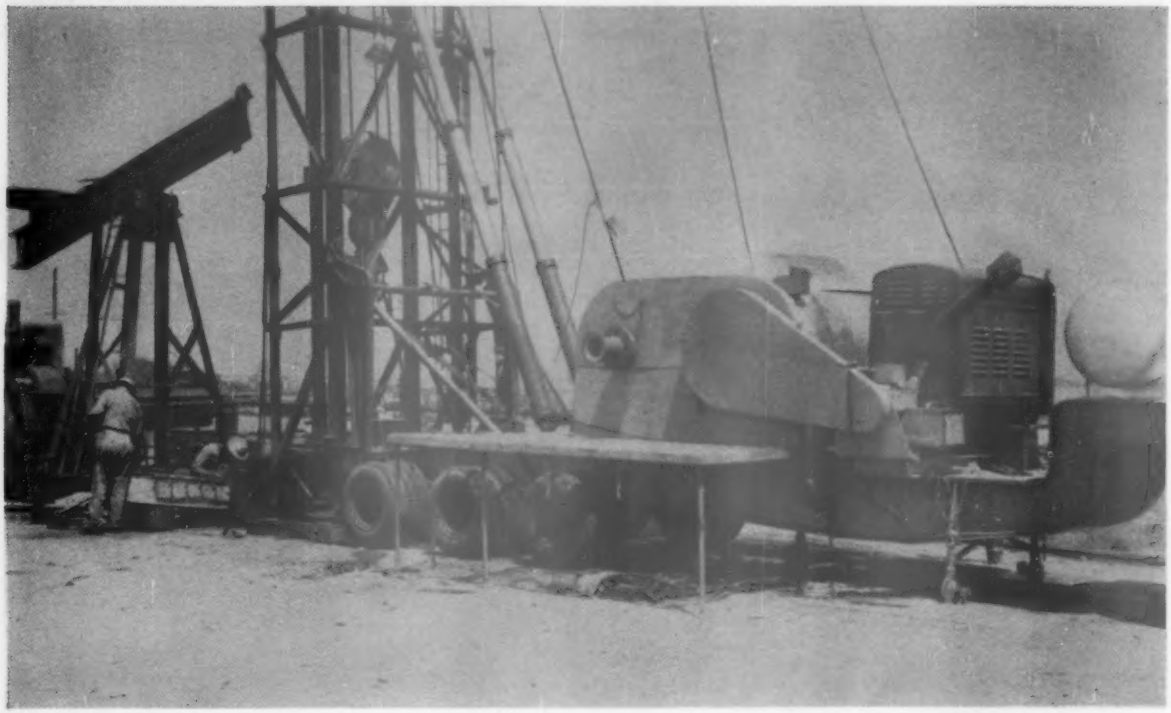

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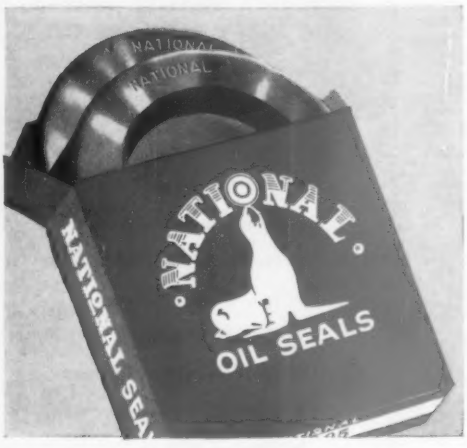

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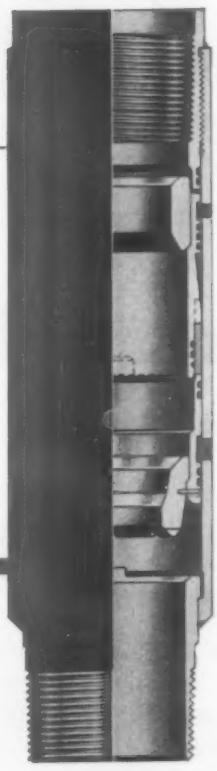

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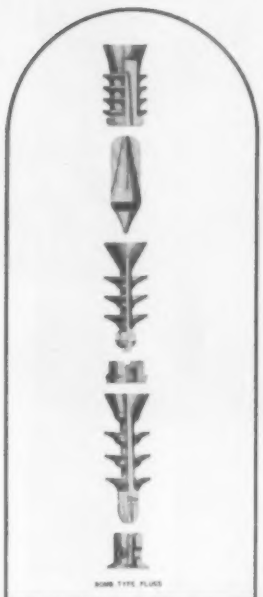

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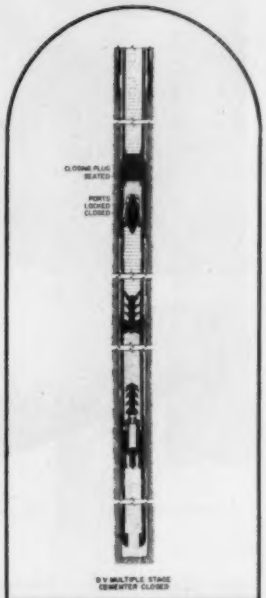

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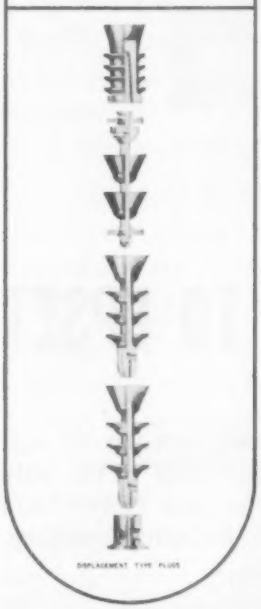
The tool may be used with either Bomb Type Plugs or Displacement Type Plugs.



BOMB TYPE PLUGS

Are used where cement is not required on the bottom stage to fill the annulus to the point where the "DV" tool is located . . . or, where the distance between the tool and the casing shoe is relatively large. With this type plug, the first stage of cement may be allowed to set, minimizing the chance of possible blow-out, before additional stages are placed in the casing.

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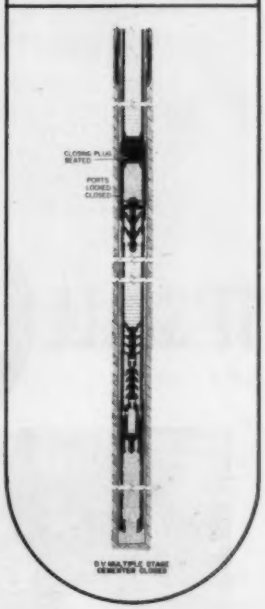

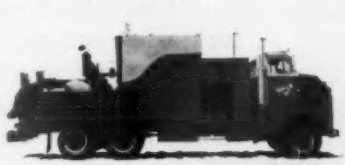

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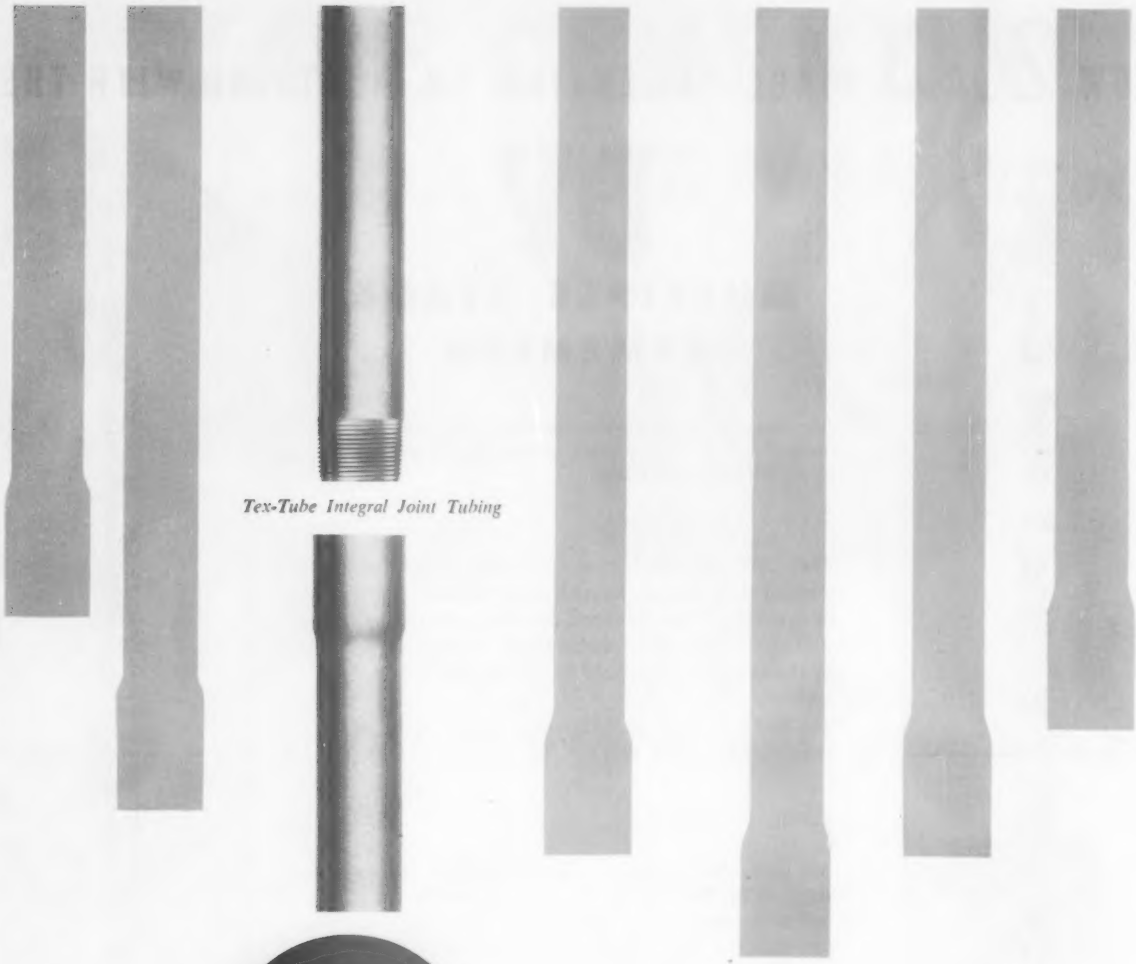

Tex-Tube Integral Joint Tubing

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No. 4 Upsetter

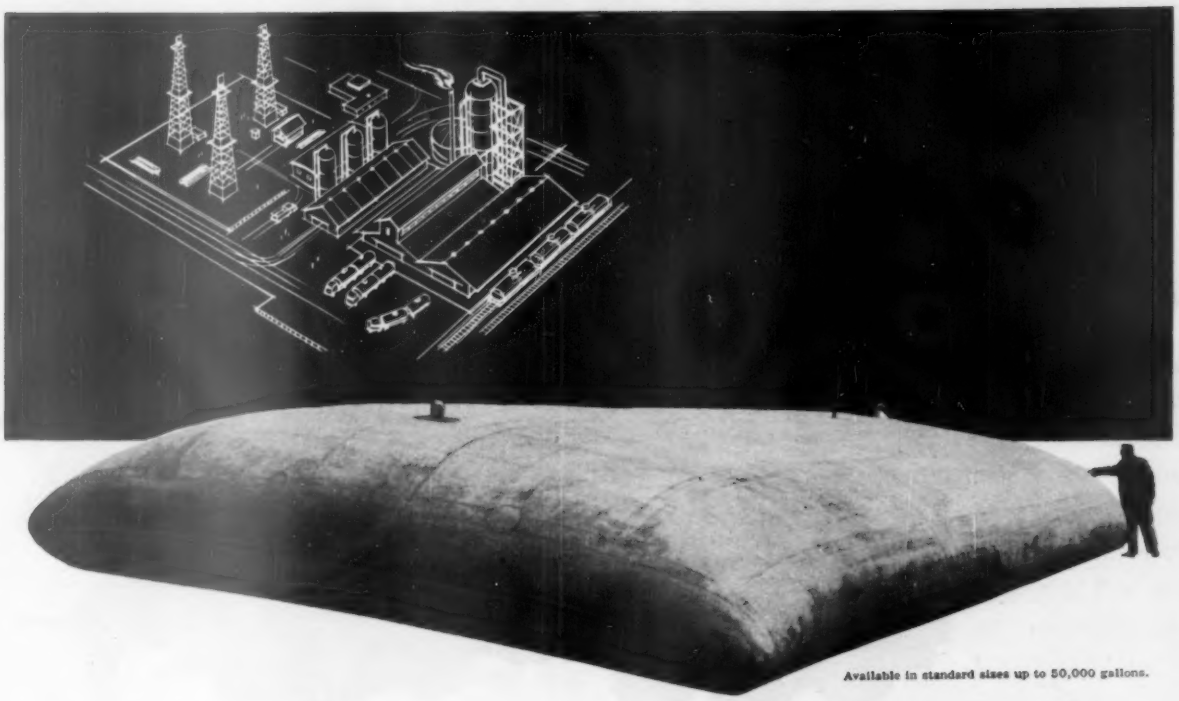
Tex-Tube's new Series 301 small diameter oil well tubing in 1¼" and 1½" nominal sizes is the only macaroni tubing made entirely in one mill — from coiled stock to finished product — including upsetting, threading and normalizing.

This is your assurance of undivided responsibility for quality and prompt delivery.

Tex-Tube also has complete finishing facilities for, and stocks of, all sizes and grades of standard macaroni tubing from ¾" nominal through 2 1/16" O.D.

TEX-TUBE, INC.

1503 NORTH POST OAK ROAD • HOUSTON, TEXAS
Sales Offices in Midland, Dallas, Tulsa and Los Angeles



Available in standard sizes up to 50,000 gallons.

LIKE TO LIQUIDATE A LOT OF LIQUID STORAGE COSTS? Then you'll like PILLOW Tanks from the G.T.M.—Goodyear Technical Man—and his colleagues. These collapsible, oil-resistant rubberized fabric containers eliminate numerous steel drums and costly, slow-to-install metal tanks in dozens of oil-field operations.

You can use them, for example, as fuel stations during drilling—to hold fresh or salt-water during a fracturing job—to store "crude" while you're erecting permanent tanks. They'll serve as "breathers" for storage tanks at refineries or pumping stations.

GOODYEAR INDUSTRIAL PRODUCTS

G.T.M.-Specified

PILLOW Tanks in the Following Standard Sizes

(Standard sizes rolled for shipment or storage)

900 gals.	138" x 20" x 11"
3,000 gals.	144" x 20" x 15"
6,000 gals.	110" x 20" x 20"
10,000 gals. (square)	120" x 18" x 16"
10,000 gals. (rectangular)	148" x 20" x 16"
15,000 gals.	180" x 20" x 20"
20,000 gals.	180" x 20" x 20"
50,000 gals.	204" x 60" x 24"

No matter how or where you want to use them, you'll have them—ready to work—fast. For you need no technical personnel to unroll or handle a PILLOW Tank. In a few minutes it can be set up—ready for use.

Come time to move on and it rolls up again like a rug. The popular 10,000-gallon size, for instance, folds to a neat roll just 12 feet long, 20 inches in diameter, and weighing only 700 pounds. And tough, weather- and age-resistant PILLOW Tanks can be used over and over.

That's only the beginning. For the complete story on the fabulous new PILLOW Tanks, look for the G.T.M. under "Rubber Products" in the Yellow Pages of your phone book—or write Goodyear, Industrial Products Division, Akron 16, Ohio.

Pillow—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

the big name in rubberized fabric containers:

GOODYEAR

THE GREATEST NAME IN RUBBER

FRANKS *Explorer Rocket*

FRANKS *Explorer Cruiser*

OFTEN IMITATED . . . NEVER DUPLICATED

WORTH MORE WHEN YOU BUY 'EM
WORTH MORE WHEN YOU TRADE 'EM

Common sense will tell you that there **is** a difference in most things despite the tendency to imitate the leader. There's a difference in baseball players . . . in cooks . . . yes, even in oil well servicing units . . . although competitive units are getting to look mighty like the Franks Explorer.

Now, this **difference** is what keeps the Franks Explorer ahead of the pack. It's the difference which makes superintendents prefer Franks units on their jobs. It's the difference you feel in your pocketbook when you trade it in. The higher resale value of Franks Explorers speaks louder of this difference than any words we can dream up.

Ask the man who uses Franks!

Explorer FEATURES

- Full view control console
- Engineered weight distribution
- True capacity rated derricks, 100,000 to 275,000#
- Less downtime thru industrial engine economy, power and dependability
- High resale value as used equipment
- Field acceptance established

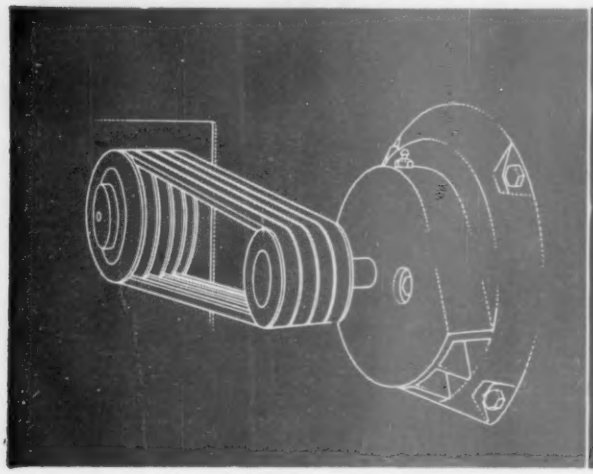
ON THE SPOT . . . 'ROUND THE CLOCK . . . FIELD SERVICE

WELL SERVICING AND DRILLING UNITS
FRANKS
DIVISION OF
PAMPA, TEXAS
CABOT SHOPS, INC.

OFTEN IMITATED . . . NEVER DUPLICATED

BEFORE: This drawing of the former 4-belt drive on a clothes pressing unit is in the same scale as the photo of new Super HC V-Belt Drive at right. Heavy sheaves needed for 4 belts imposed high bearing loads.

AFTER: By redesigning the drive for Gates Super HC V-Belts only 3 belts are required and this Utah manufacturer saves 16 pounds in weight and 24% on the drive cost of every pressing unit it makes.



Manufacturer of pressing equipment cuts cost of drives 24%

New high capacity V-belt also saves weight and space!

This manufacturer is just one of many who have already turned to Gates Super HC V-Belts to achieve far more compact, lighter weight, lower cost V-belt drives for all types of machines. With new Super HC V-Belts, sheave dimensions can be reduced 30% to 50%, overall space up to 50%, and drive weight by 20% and more.

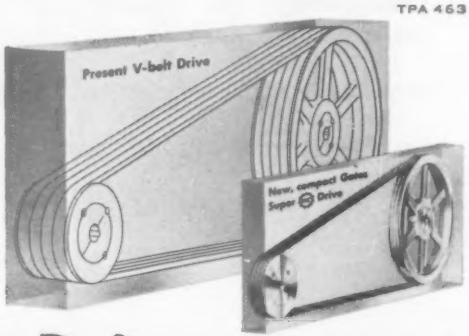
A product of Specialized Research in the world's largest V-belt laboratories at Gates, the Super HC V-Belt Drive is already standard equipment on production models in virtually every industry.

Engineering Service Nation-Wide

Whatever your plant's power transmission design problem, wherever you are, your nearby Gates Distributor or Field Representative is ready to assist you to cut space, weight, and costs with Super HC. Ask him for a copy of *"The Modern Way to Design Multiple V-Belt Drives."*

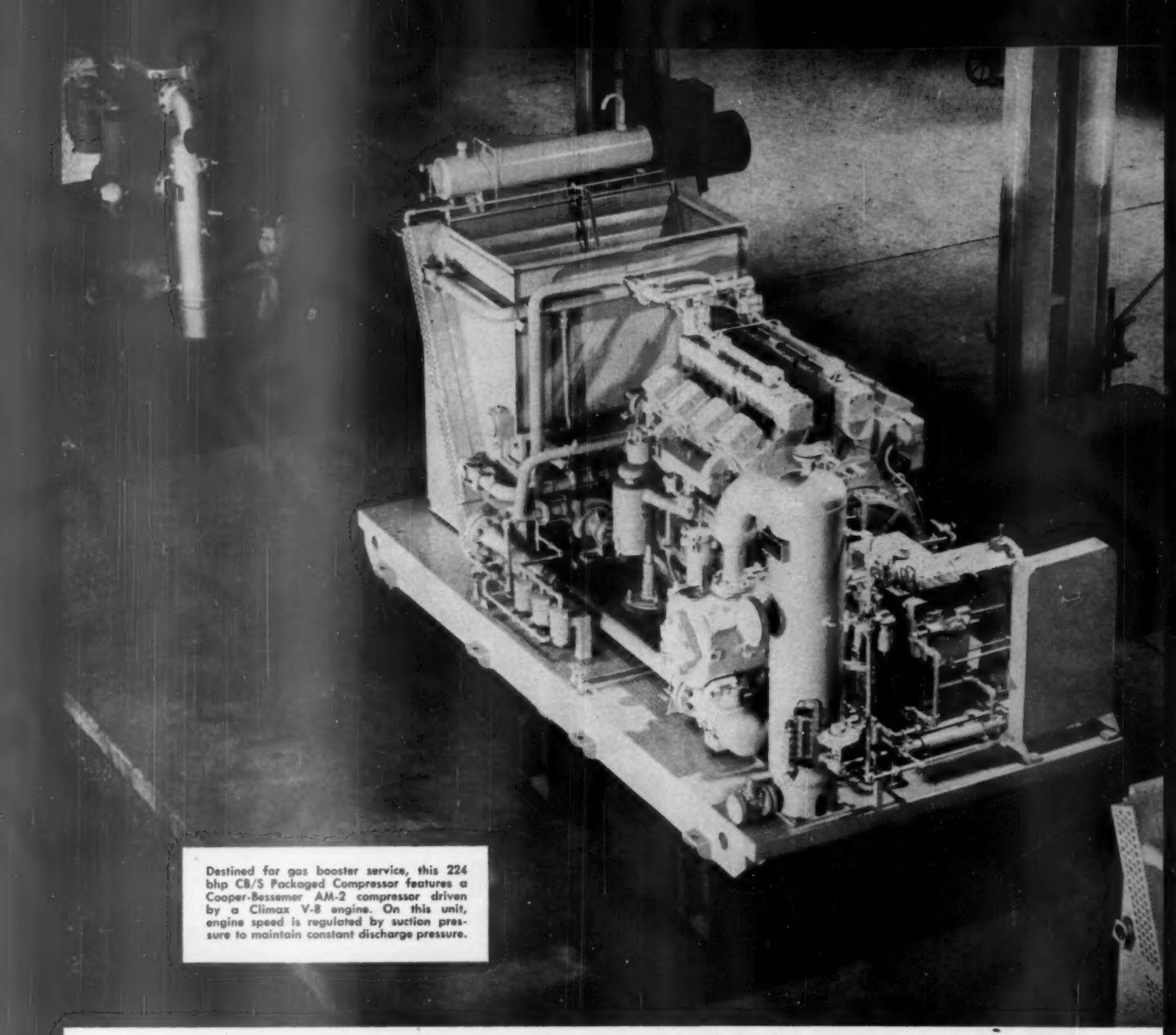
TPA 463

The Gates Rubber Company, Denver, Colorado
Gates Rubber of Canada Ltd., Brantford, Ontario



Gates *World's Largest Maker of V-Belts*

Gates Super HC V-Belt Drives same hp capacity in smaller "package"



Destined for gas booster service, this 224 bhp CB/S Packaged Compressor features a Cooper-Bessemer AM-2 compressor driven by a Climax V-8 engine. On this unit, engine speed is regulated by suction pressure to maintain constant discharge pressure.

Building packaged compressors is our business . . . our only business. This single objective is the reason CB/S Packaged Compressors are more advanced in design . . . more efficient in the field.

CB/S
PACKAGED
COMPRESSORS

CB/S

C-B SOUTHERN, INC., P. O. BOX 19267, HOUSTON 24, TEXAS

A subsidiary of The Cooper-Bessemer Corporation.

The GOLDEN GIRLS ARE GONE...

Now Mid-Continent's U-712 is the star performer

Oil Show rig now drilling in Argentina

Having seen more glamorous days in the Oil Show limelight, this rugged Mid-Continent U-712 Drawworks is now performing for a major drilling contractor on the Pampas of Southern Argentina. Designed as a single package unit, the U-712 has a 25" O.D. by 51½" long main drum and self-equalizing 48" by 10" brakes. Fawick VC Clutches are mounted on the drum shaft for low and high drum drives, with an emergency splined clutch provided for the low drive. Grease lubrication for bearings, and flood lubrication for chains, sprockets and splined clutches is designed-in the drawworks. For complete information, write for the U-712 Bulletin or contact your Mid-Continent representative.

Pictured here at rig-up time, and ready for shipment to Argentina, this rig with the Mid-Continent U-712 Drawworks, AE Swinging Compound and Swinging Pump Drives to two D-700 Emsco Pumps, is powered by Cummins VT-12 TURBODIESEL Engines.

MID-CONTINENT—SUPERMARKET FOR THE OIL INDUSTRY

DW2-0

MID-CONTINENT SUPPLY CO.

THE WORLD'S LARGEST INDEPENDENT OIL FIELD SUPPLY COMPANY

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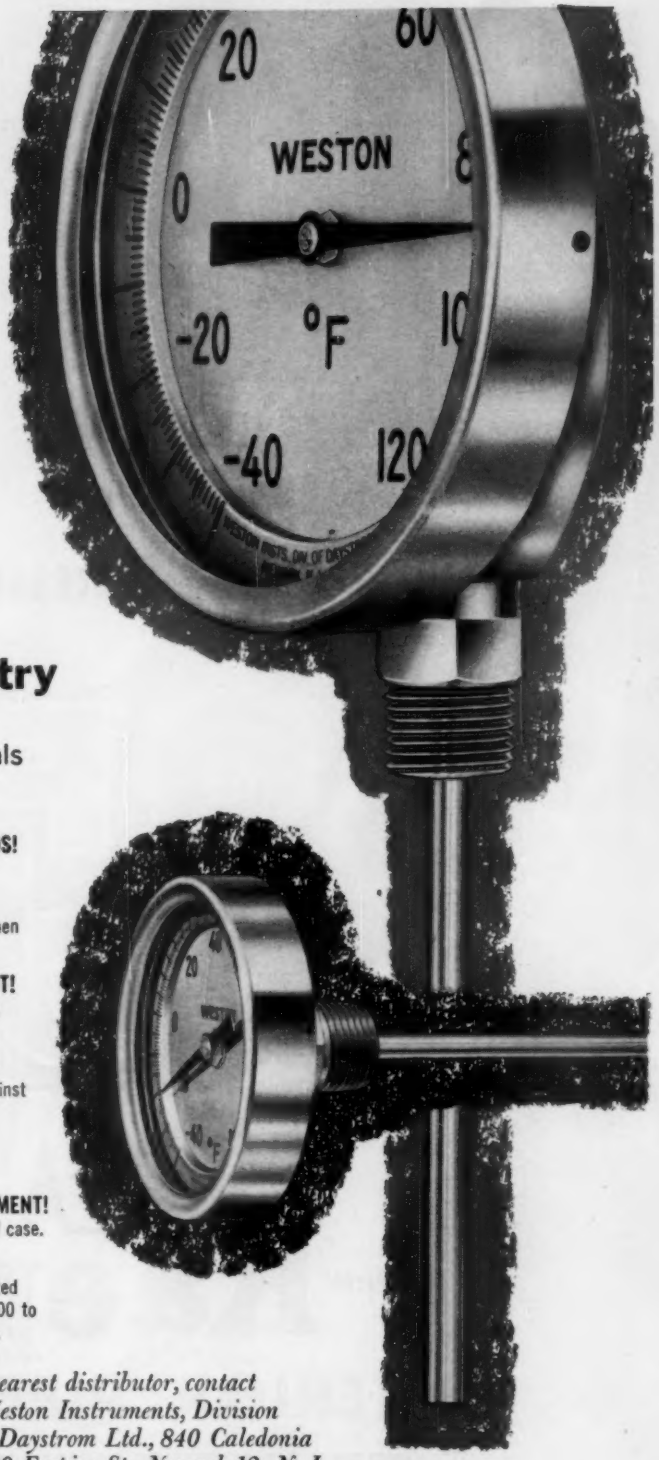
Weston Presents

a new departure in industrial thermometry



The new 4000 series of heavy-duty bimetals offers these 7 points of distinction:

- **ALL-STAINLESS-STEEL CONSTRUCTION, INCLUDING WELDS!**
  A new high in ruggedness and serviceability is achieved.
- **IN-LINE SCALES ELIMINATE PARALLAX ERROR!**
  New scales lie in the same plane as pointers—no misreading when mounted away from eye-level.
- **REMOVABLE BEZELS PERMIT EASY WINDOW REPLACEMENT!**
  Heavier scale glasses stand more punishment without breakage. In the event of a mishap, windows can be replaced in the field.
- **NEW COMPOSITION GASKETS PROVIDE OPTIMUM SEAL!**
  This newly-developed material assures maximum protection against "breathing" and leakage.
- **ACCURACIES OF ±1% ARE ASSURED!**
  Guaranteed accuracies of 1% of range.
- **EXTERNAL ADJUSTMENT FEATURE IS STANDARD EQUIPMENT!**
  A readily accessible Allen screw adjustment is located on side of case.
- **FULL LINE OF SIZES, STEM LENGTHS AND RANGES!**
  3-inch and 5-inch diameter heads . . . back and bottom connected models with rotatable scales . . . ranges cover an area from —100 to 1000F or —100 to 500C . . . standard stems up to 72" available.

For full information, or for the address of your nearest distributor, contact your local Weston representative . . . or write to Weston Instruments, Division of Daystrom, Inc., Newark 12, N. J. In Canada: Daystrom Ltd., 840 Caledonia Rd., Toronto 19, Ont. Export: Daystrom Int'l., 100 Empire St., Newark 12, N. J.

A DAYSTROM UNIT

WESTON *Bi-metal Thermometers*

WORLD LEADER IN MEASUREMENT AND CONTROL

FIVE
TO
TEN
PER CENT
increased
FLOW
WITH Kaepox
INTERIOR PIPE COATING
offering positive corrosion protection particularly in sour crude lines with application in place or above ground.
for additional information call, write or wire:
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132 North Mosley
Wichita, Kansas
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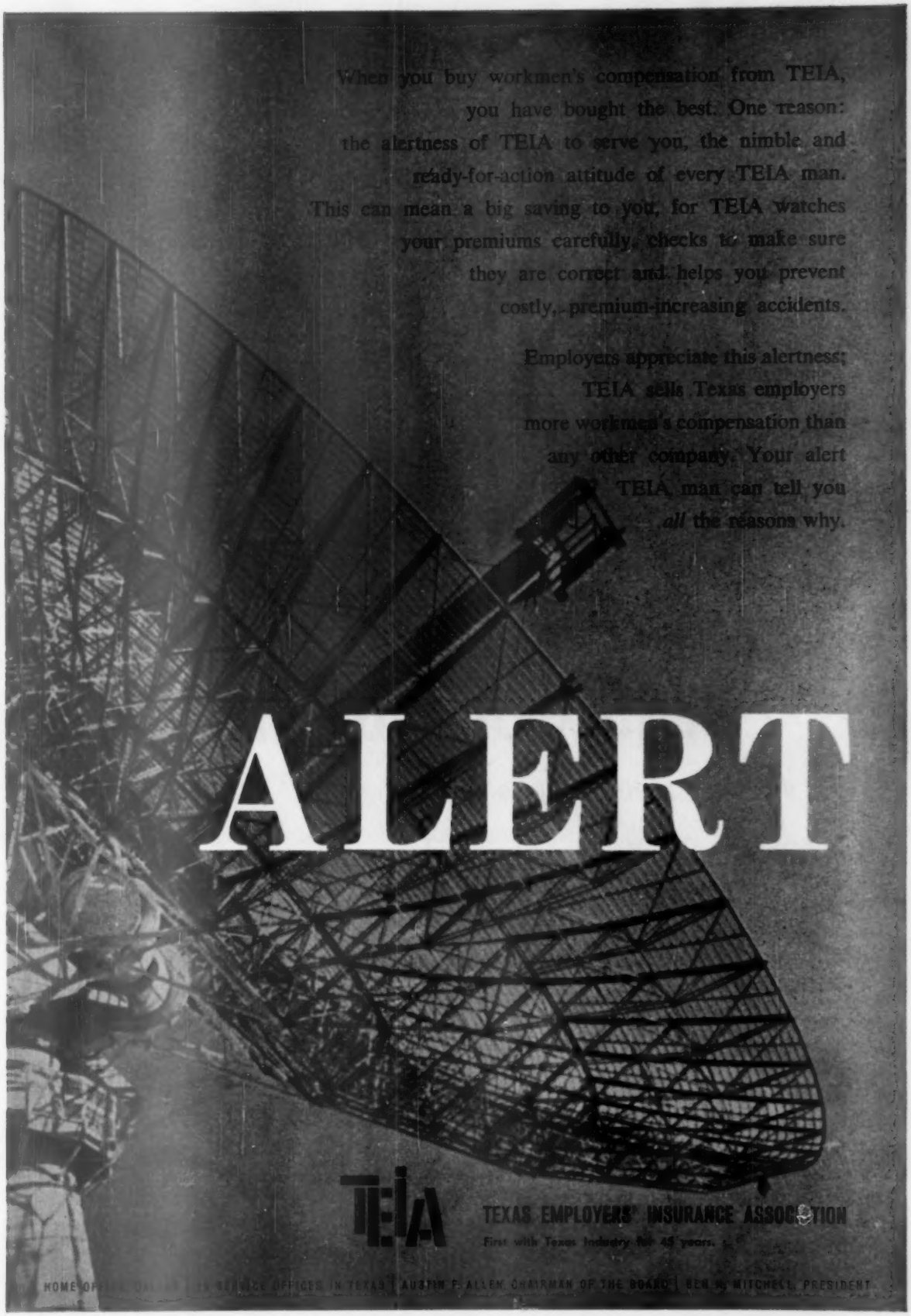
When you buy workmen's compensation from TEIA,
you have bought the best. One reason:
the alertness of TEIA to serve you, the nimble and
ready-for-action attitude of every TEIA man.
This can mean a big saving to you, for TEIA watches
your premiums carefully, checks to make sure
they are correct and helps you prevent
costly, premium-increasing accidents.
Employers appreciate this alertness;
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any other company. Your alert
TEIA man can tell you
all the reasons why.
ALERT
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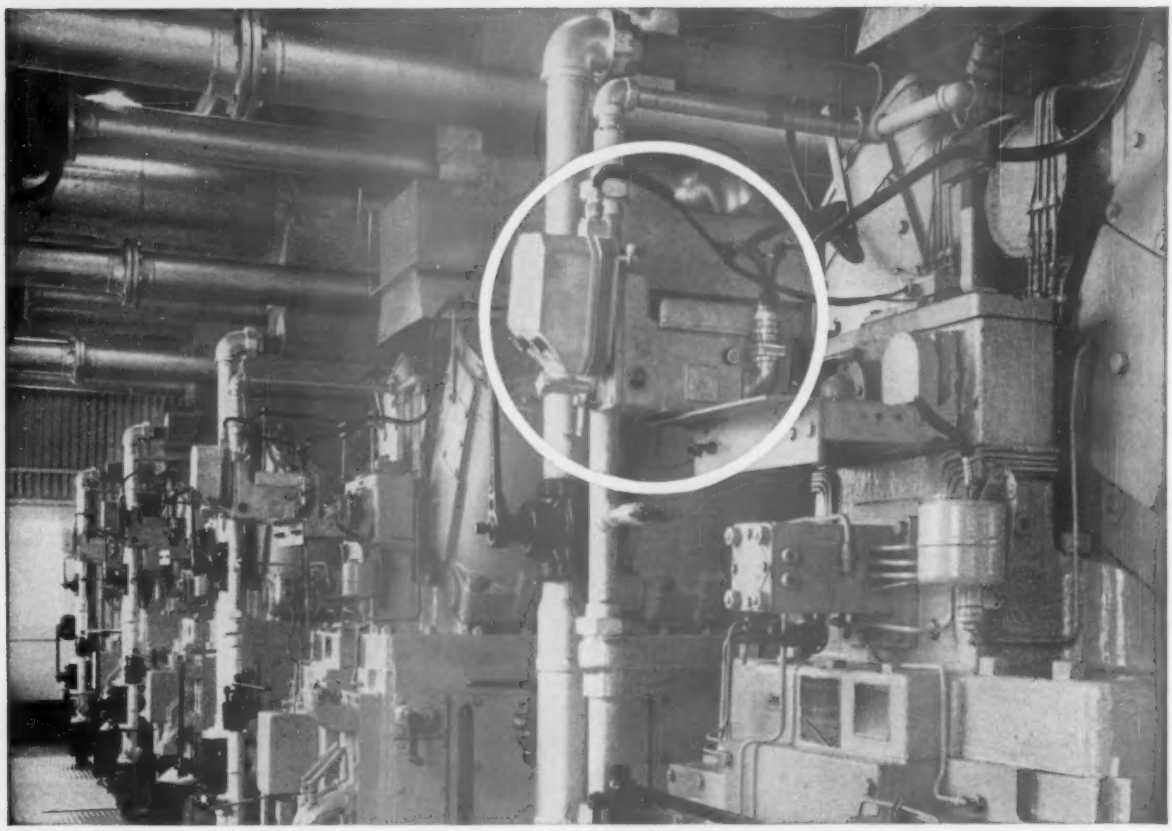
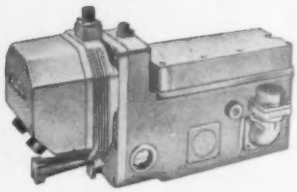
TEXAS EMPLOYERS' INSURANCE ASSOCIATION
First with Texas Industry for 45 years.
HOME OFFICE DALLAS 21 SERVICE OFFICES IN TEXAS | AUSTIN P. ALLEN CHAIRMAN OF THE BOARD | BEN M. MITCHELL PRESIDENT



BENDIX DLC IGNITION

designed specifically for natural gas and petroleum industries

Hi-V Coil



DLC Magneto

A MATCHED IGNITION SYSTEM

1. Long service life
2. Simplified maintenance
3. Longer spark plug life
4. No unscheduled ignition shutdowns
5. Positive spark timing
6. High voltage output
7. Matched ignition system
8. Single or dual ignition
9. Flameproof
10. Low maintenance costs
11. For engines of 6 through 16 cylinders

At the installation shown here, DLC Ignition unfalteringly performs its function in aiding with the preparation of natural gas for consumer use.

Bendix* DLC Ignition is the result of the most modern engineering design, and incorporates the latest developments in ignition materials. That's why it meets the most exacting requirements of modern high-compression engines used by the natural gas and petroleum industries.

Because DLC Magneto and Hi-V Transformer Coils form a matched ignition system, it delivers ample voltage while, at the same time, assuring reduced maintenance costs.

If you want facts on why important operators specify Bendix DLC Ignition, write: SCINTILLA DIVISION, BENDIX AVIATION CORPORATION, SIDNEY, NEW YORK. *REG. U.S. PAT. OFF.

Export Sales and Service: Bendix International Division, 205 E. 42nd St., New York 17, N. Y. *Canadian Affiliate:* Aviation Electric Ltd., 200 Laurentien Blvd., Montreal 9, Quebec. *Factory Branch Offices:* Burbank, Calif.; Orlando, Florida; Chicago, Ill.; Teaneck, New Jersey; Dallas, Texas; Seattle, Washington; Washington, D. C.

Scintilla Division
SIDNEY, N. Y.

Bendix
AVIATION CORPORATION

How to make tracks at pig-running time!

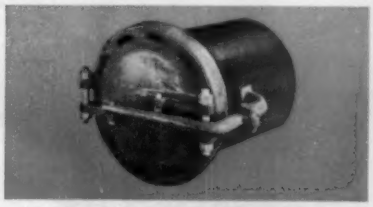
Unibolt hinged scraper traps are the answer

But not even a Unibolt Scraper Trap . . . with its easy-opening two-bolt coupling, its free-swinging hinged closure, its tight-sealing, long-lasting resilient gasket . . . can take all the work out of catching a pig. It comes mighty close, though, to making the job of starting and catching scrapers a trouble-free operation.

Unibolt originated the hinged closure to eliminate the troublesome, time-consuming multi-bolt blind flange. And the Unibolt self-sealing resilient gasket that remains in place when the closure is opened seldom, if ever, needs replacing. This saves you money as well as time. And a Unibolt Scraper Trap installed on an oversize barrel, the i.d. of which is slightly larger than the o.d. of the line, eliminates "fighting" the pig in and out of the trap. Line pressure does the heavy work.

The Unibolt Hinged Blowdown, or blowoff head, is an ideal companion to the Unibolt Scraper Trap on gas line service.

Complete details are carried in Bulletin PL-590, copies of which will gladly be sent on request.



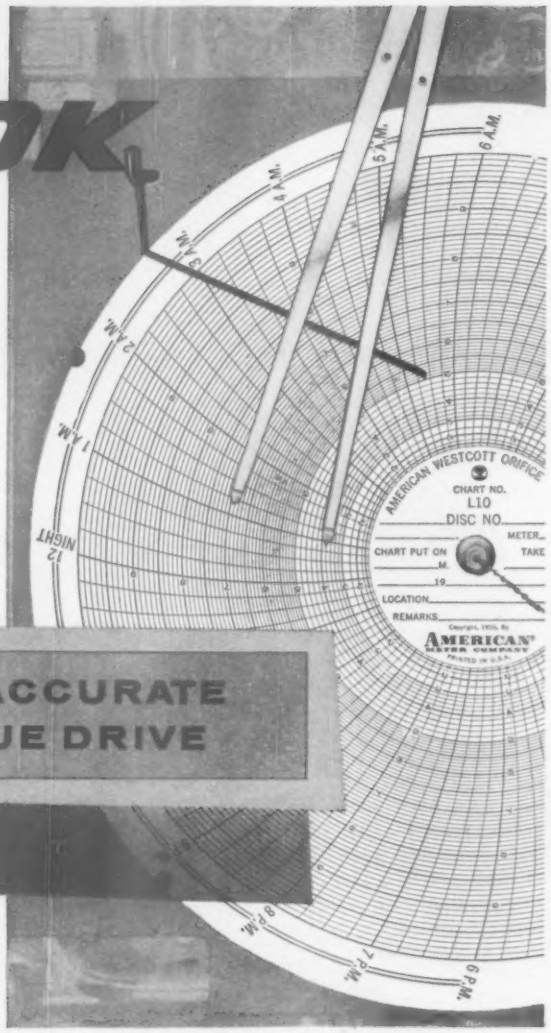
A hinged type Unibolt Scraper Trap in closed position.

UNIBOLT

THORNHILL CRAVER CO.

P. O. Box 1184, Houston, Texas

AMERICAN®
GASCLOK
POWER DRIVE



Check these features--

- **Completely self-contained gas or air-powered instrument driving and timing unit for long, trouble-free operation in remote locations.**
- **Constant high power...more than 20 times the torque delivered by conventional spring-wound mechanisms.**
- **Timing accuracy continuous...no heavy "mainspring" to weaken or run down...unaffected by a ± 20% variation in supply pressure.**
- **Self-starting...no winding or priming of power unit.**

VERSATILE • ACCURATE
HIGH TORQUE DRIVE

- **Flexibility...ideal as original or replacement equipment for strip chart and conventional circular chart instruments.**
- **Built-in durability...timing mechanism internally sealed to prevent corrosion...large area internal ports prevent clogging.**
- **Rugged dependability...all power unit parts exposed to gas are aluminum or stainless steel...inherently explosion proof.**
- **Economical...normal air or gas consumption 5 cfh...operating pressure 5 psi...rotation 2 rpm.**

Then ask
your American representative how the versatile ***GASCLOK*** can provide new metering accuracies and economies for you.

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COMPLETED AS A PRODUCER . . .
BELOW 20,000 FEET

Had this well been dry, it would merely be another statistic. Yet, it was completed as a producer.

To prove production possibilities on this deep Louisiana well, five Drill Stem Tests were run below the 20,000 ft. mark. In each instance, the packers were set below 20,000 feet, making these the deepest Drill Stem Tests ever recorded.

Testing conditions were most severe. Throughout each test, bottom hole temperature was 426°, mud weight ranged from 18.2 to 18.4, with a viscosity varying from 50 to 60. During the five deep tests, Johnston equipment encountered and recorded formation pressures as high as 19,365 psi and hydrostatic mud pressures up to 22,045 psi.

Packers and other equipment have previously been run and set below this depth; however, none in a Drill Stem Testing operation, nor under the conditions encountered in this well.

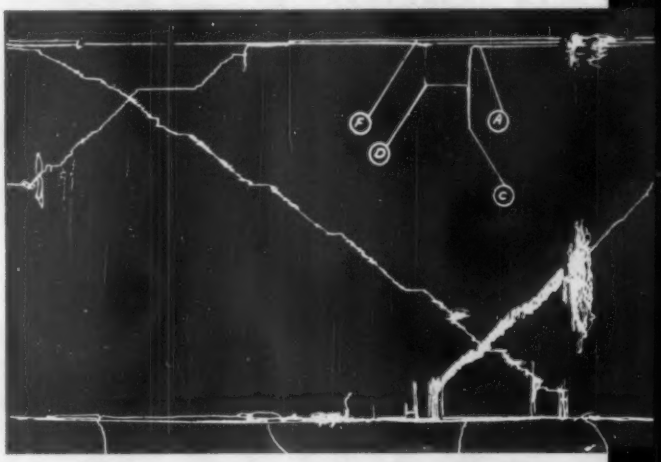
No misruns or equipment failures occurred. All equipment was retrieved intact. On two tests, equipment remained in the hole over twenty hours. Tests were performed in 7 inch—35 lb. casing through a 3/8 inch bottom hole choke. All were successful.

Drilling a well below 20,000 feet is a significant accomplishment, especially with the subsurface conditions peculiar to the Gulf Coast. The five Johnston Tests performed at this depth are also significant. They are testimony to the fact that Johnston can conduct Drill Stem Testing operations at extreme depths where high bottom-hole temperatures and extreme high pressures are encountered.

The drilling, testing and completion of this well is a prime example of the value of experience and planning, and proves the advisability of gathering all available information and data for evaluation prior to completing any well.

In any area . . . in any well . . . deep or shallow . . . high pressure or low pressure . . . before you set casing on your next well, call Johnston Testers. You get more from a Johnston test.

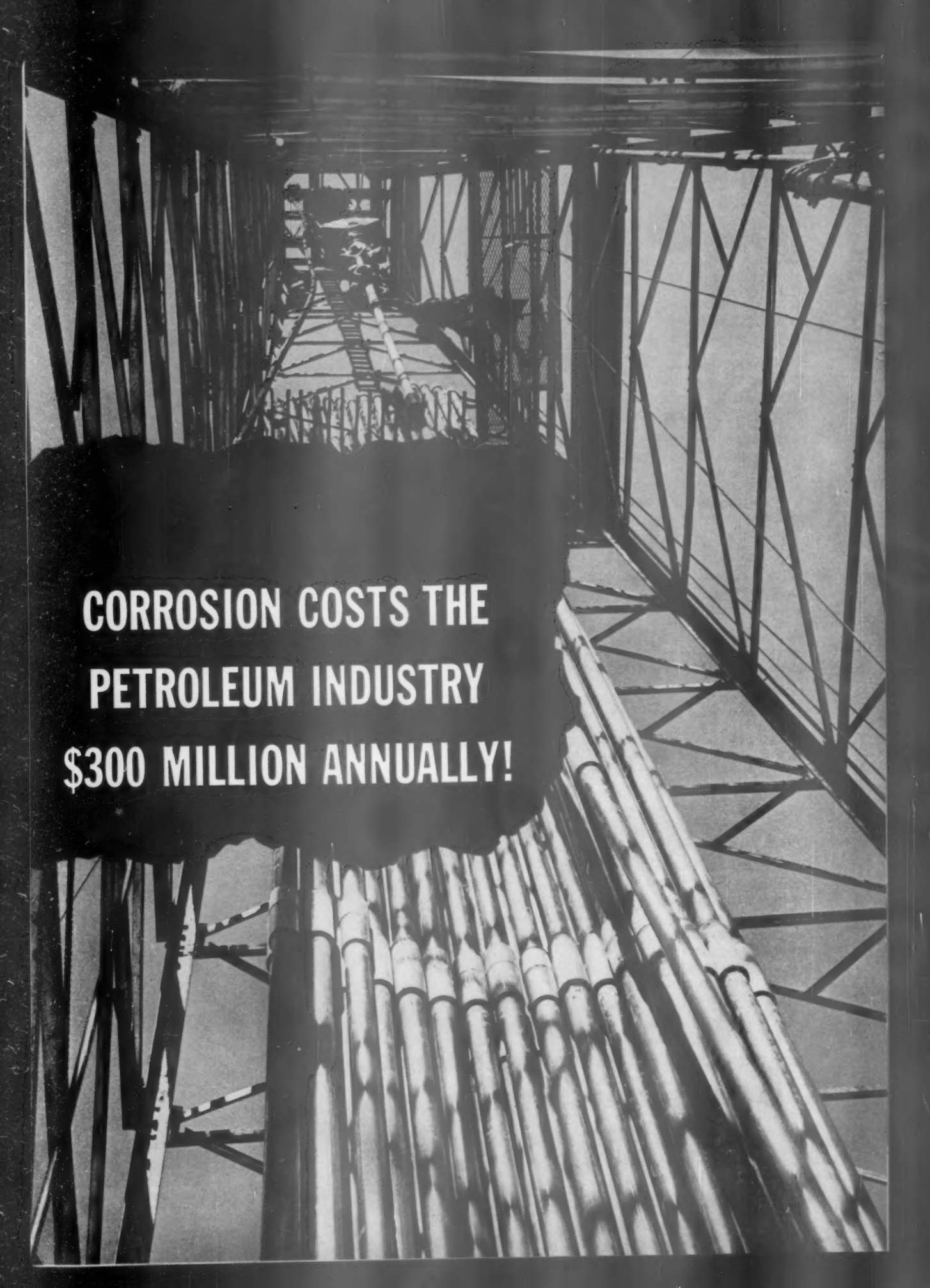
All tests were performed by Johnston Testers using the new Johnston testing tools.



FINAL TEST
Packer set at 20,068'
Initial Hyd. Mud 19,960 psi
Initial Flow 15,435 psi
Final Flow 17,719 psi
Final Hyd. Mud 20,061 psi
Recovery Oil (39.5° Gravity) and Gas

JOHNSTON TESTERS, INC.

P. O. Box 98 Houston 1, Texas


CORROSION COSTS THE
PETROLEUM INDUSTRY
$300 MILLION ANNUALLY!

...Now You Can Control 96% of All Your Petroleum Corrosion Problems with this Proven PITT CHEM® Coating System!

Corrosion ranks as a major "cost" factor in the production of crude oil and petroleum products. The American Petroleum Institute estimates that corrosion costs the industry 300 million dollars annually, or 11 to 14 cents per barrel of throughput.

From initial exploration, through transportation and storage, Pittsburgh now provides the petroleum industry with a complete system of heavy duty protective coatings formulated to meet specific petroleum corrosion conditions. Service-proven PITT CHEM Coatings save thousands of dollars every day, protecting valuable equipment against sour crudes, condensate, sweet oils and a variety of corrosive environmental conditions.

PITT CHEM Tarset, Tarmastic and Insul-Mastic are tough, *heavy film* coatings that outlast conventional maintenance paints 10 to 20 times. You measure their protection in *decades*, not years. They can be cold-applied by brush, spray gun or roller. No other family of protective coatings can solve so *many* of your corrosion problems so *economically*.

For more information, mail the coupon below. Then consult your nearest PITT CHEM Distributor—he's listed in the "Yellow Pages." Or call Pittsburgh Coke & Chemical Company in Pittsburgh, New York, Chicago, Houston or Los Angeles. A PITT CHEM Corrosion Engineer will be glad to discuss your corrosion problems without obligation.

PITT CHEM TARSET®

Tarset, the original, patented, coal tar-epoxy coating, has solved some of the most difficult corrosion problems in the petroleum industry. Applications to crude oil storage tank interiors, gasoline and jet fuel storage tanks, underground pipelines and pipe joints have proven Tarset's protective ability.

PITT CHEM TARMASTIC®

PITT CHEM Tarmastic coal tar coatings are a series of protective coatings designed to meet a wide variety of corrosive conditions at moderate cost. Oil tank exteriors, structural steel, concrete, piling and waste systems are just a few of the many proven applications for Tarmastic coatings.

PITT CHEM INSUL-MASTIC®

Vapor and moisture penetration problems are solved economically and effectively with Insul-Mastic Gilsonite-asphalt coatings. Petroleum plants use Insul-Mastic to protect metal buildings, tanks and equipment. Insul-Mastic insulating mastics provide good heat loss reduction and condensation control.

PITT CHEM PIPELINE ENAMELS

For the long-term preservation of underground pipelines, coal tar enamels are considered the most practical and effective method of protection ever developed. PITT CHEM Pipeline Enamels are widely recognized for their excellent quality and service record on oil, gas and water transmission and distribution lines throughout the nation.

Send for Your Free Copy of this

PETROLEUM CORROSION DATA FILE

Includes a survey of corrosion problems in the Petroleum Industry, data on PITT CHEM Coating Systems and a coating selector guide.

Name_____ Title_____

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PITTSBURGH COKE & CHEMICAL CO.

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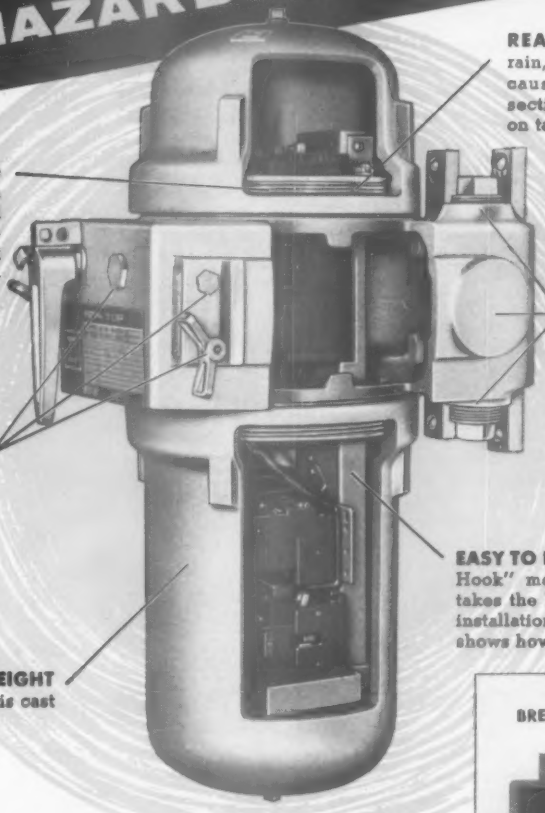
Exclusive!

"SLIDE and HOOK" for easier installation

NEW SPIN TOP® ENCLOSURE FOR HAZARDOUS LOCATIONS



REAL PROTECTION against rain, dust, dirt and weather because male threads on collar section engage female threads on tank.

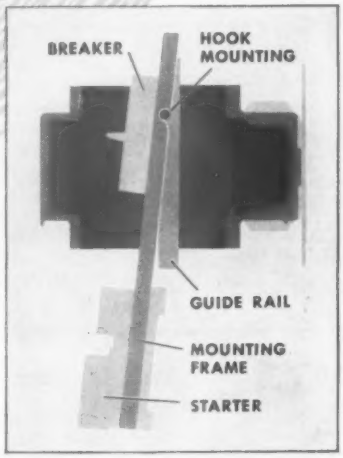
DAMAGE-RESISTING Acme thread. If you've struggled with "banged-up" threads, you'll appreciate this feature. It's always a breeze to put on and take off tanks for installation, inspection or maintenance.

INCREASED WIRING SPACE and through-feed conduit entrances for horizontal tap-offs.

EASY TO ADD pushbuttons or selector switches with easy-to-buy, easy-to-use "off-the-shelf" parts kits.

EASY TO INSTALL • "Slide and Hook" mounting arrangement takes the hard work out of the installation job. Diagram below shows how.

STRONG and LIGHTWEIGHT The complete enclosure is cast aluminum.



SLIDE and HOOK MOUNTING

4 SIZES FOR STARTERS SIZE 0 THROUGH 5

CLASS I, GROUP C and D • CLASS II, GROUP E, F, and G

The new **SPIN TOP** enclosure is available from your Square D Distributor in three ways—complete device, enclosure only, or components only...for reversing and non-reversing across-the-line starters and combination starters. And for combination and non-combination two-speed starters.

Write FOR BULLETIN 9990

Square D Company, 4041 North Richards St., Milwaukee 12, Wis.

SQUARE D COMPANY

wherever electricity is distributed and controlled

NOW IS THE TIME TO BUILD YOUR PHENOL PLANT

PROCESS ENGINEERING IS BETTER!

INITIAL INVESTMENT IS LOWER!

PLANT COMPLETION IS FASTER!

OPERATING COSTS ARE LOWER!

Thinking of producing phenol? Looking for the optimum investment in facilities? Today, with its unequalled engineering-construction background of phenol-from-cumene projects, Kellogg can build a phenol plant at a considerably lower initial investment than five years ago.

Operating costs are also lower. As proved recently in the case of one major phenol producer, chemical manufacturers realize the ultimate economies of a Kellogg-built plant when the contract is on a turn-key basis. Kellogg, in this instance, working closely with customer's engineers, was completely responsible for engineering, procurement, construction. The customer, for a lump sum, took over a complete plant—producing phenol and acetone to specs. *within 14 months after the contract was awarded.* If a phenol plant is in your company's future, investigate *now* the time-and-money-saving advantages of Kellogg's turn-key approach.

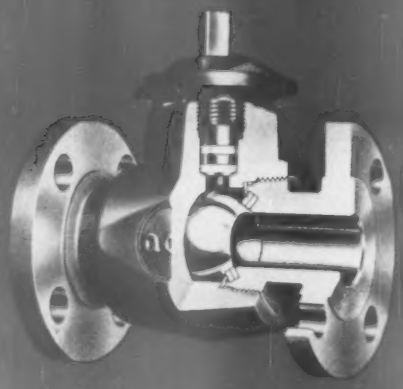
THE M. W. KELLOGG COMPANY, 711 THIRD AVENUE, NEW YORK 17

A subsidiary of Pullman Incorporated. *Offices of Kellogg subsidiary companies are in Toronto, London, Paris, Rio de Janeiro, Caracas, Buenos Aires*

M W KELLOGG

"No lubricant to contaminate ladings"

PRODUCT OF W-K-M's *Creative Engineering*



acf® non-lubricated Ball Valves

ACF Ball Valves are specially designed for ladings that require absolute purity. There is no lubricant, no possibility of contamination. The chrome-plated ball is suspended between Teflon seats under compression for leakproof sealing.

A quick quarter-turn operates this rugged valve. Specify it. You'll get efficient, economical performance. *Available at leading supply stores everywhere.*

Service-proved for 5½ years with such ladings as: gasoline • alkalis • liquefied petroleum gases • acetone • synthetic fuels • paint solvents • toluol • alcohol.

WRITE FOR CATALOG 1000

W-K-M

DIVISION OF acf INDUSTRIES
INCORPORATED
P. O. BOX 2117, HOUSTON, TEXAS

ACF non-lubricated Ball Valves feature full bore conduits, Teflon stem gaskets and seats that are sealed from the lading flow.

Working Pressures: In carbon steel with ASA ratings of 150 and 300, and a few sizes in ASA 600; in semi-steel with 200 and 400 pound ratings.

Sizes: ½" through 6".

5911-R2

Ten 20-ft. lengths of rigid pipe after being coupled. Two workmen did this job in only 20 minutes!

Workmen joining two sections of 1¼" rigid pipe.

ARIZONA PUBLIC SERVICE COMPANY SAVES 50% WITH

RIGID PIPE

made of ABS Plastic

RIGID PIPE GAS SYSTEM INSTALLATION OFFERS NEW PROOF OF SUPERIORITY OVER CONVENTIONAL TYPE

Big news for happy housewives in Gila Bend, Arizona—the convenience of gas utility service for the first time! Important news for utility companies everywhere—the 50% savings over cost of conventional pipe gained by use of Anesite rigid ABS pipe made of CYCOLAC throughout the system! Saved precious man-hours, too! Arizona Public Service Company completed the job in record time . . . insured a failure-free system with this lightweight, leak-proof, AGA-approved pipe. Another example of better service . . . bigger savings from rigid plastic pipe in vital municipal installations!

BE *ABSolutely* SURE . . .
INSIST ON RIGID *ABS* PIPE
made of
CYCOLAC®
THE BORG-WARNER PLASTIC THAT IS TOUGH, HARD AND CORROSION-RESISTANT

Write for the name of your nearest supplier

MARBON CHEMICAL
WASHINGTON

MARBON CHEMICAL
B-W
BORG-WARNER

DIVISION **BORG-WARNER**
WEST VIRGINIA

For FAST and RUGGED SERVICE

Use Guiberson's
TYPE F TUBING SPIDER
for wells of any depth

One hand or one foot operates this rugged tubing spider — so advanced in design it lets you spin tubing joints on or off in record time while it keeps hands free for other work. Slips automatically retract as the pedal is pushed down.

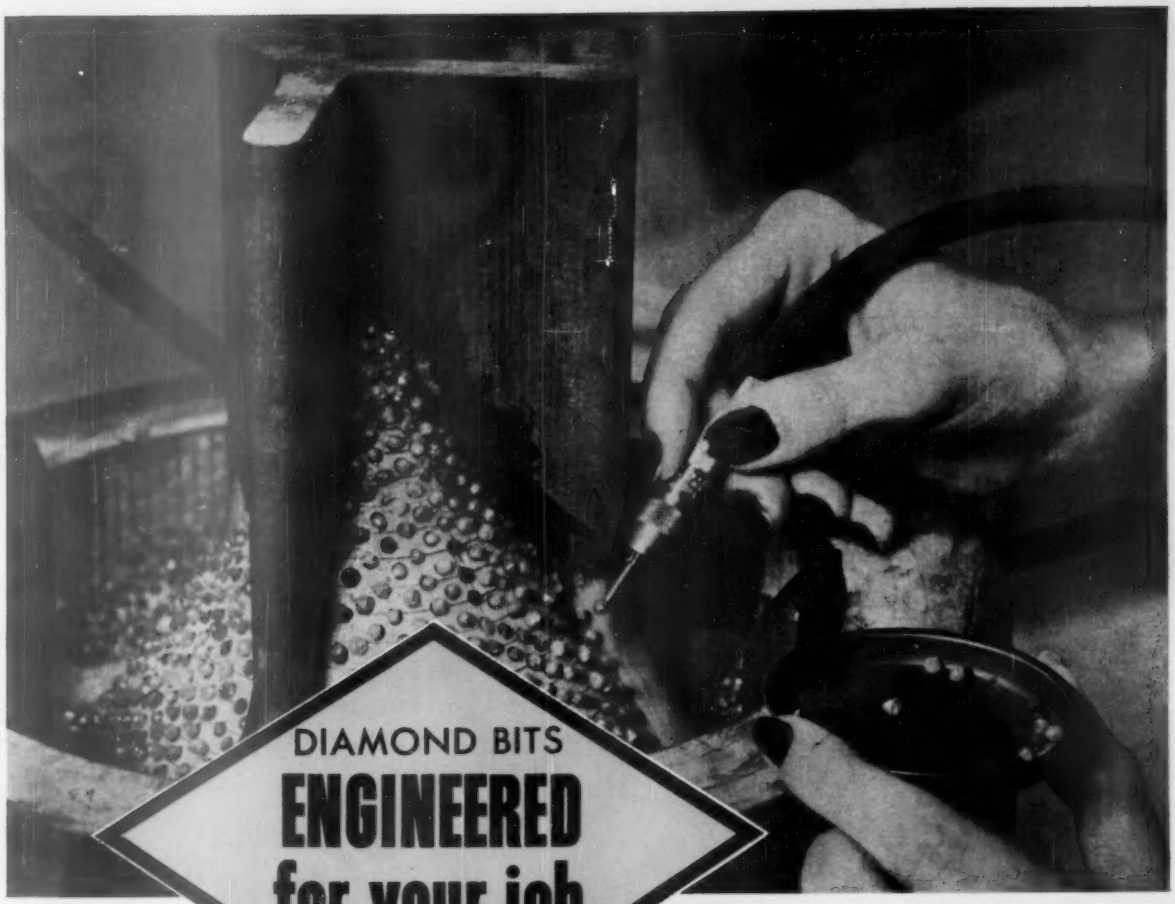
Made for heavy duty, the Type F spider will hold any length tubing string. Slip teeth grip quick, sure and tight, locking pipe against rotation either way — grip smoothly, won't crush the tubing.

Long-lasting slip teeth are in segments. The full set of 18 segments is replaceable on the rig at about the same cost as resharpening, and crews tell us they are a lot handier. They tell us, too, that the Type F spider lets them work faster with less effort and far greater safety.

Get the Best — Get Guiberson.

Slips make 3-point contact with bowl and tubing for automatic alignment and even load distribution.

THE
GUIBERSON
CORPORATION
ESTABLISHED 1919
DALLAS, TEXAS U. S. A.



DIAMOND BITS

ENGINEERED for your job

mean

"Less Cost Per Foot"

And to assure you of "less cost per foot" drilling, Christensen engineers each bit to meet a specific drilling requirement. The waterways, matrix and style are designed for correct diamond placement, concentration and size. The diamonds are carefully sorted into proper sizes and graded to assure uniform quality. Then they are hand set by Christensen's staff of experienced technicians to be sure that the best cutting side of the diamonds works for you. The proper diamond exposure is determined by the formation in which the bit will be used. This combination of Christensen custom engineering and smooth cutting diamonds means top performance for you regardless of hole size, circulating medium or type of formation.

Diamonds Mean, "Less cost per foot."

CHRISTENSEN DIAMOND PRODUCTS

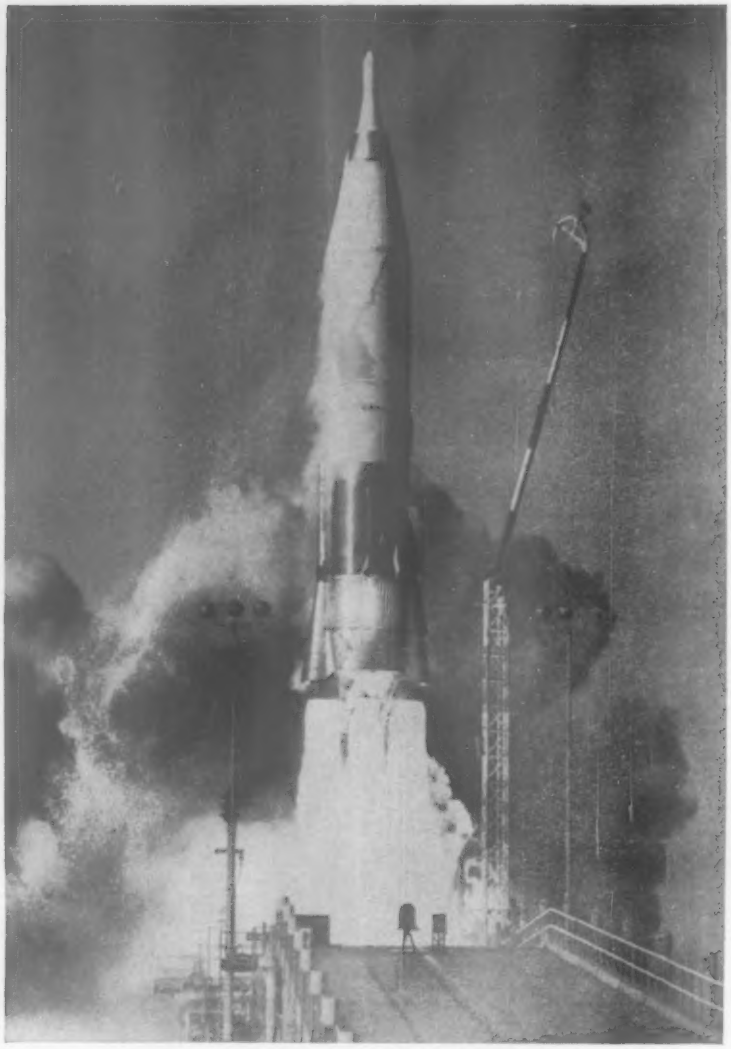
MAIN OFFICE AND PLANT 1937 SOUTH 2nd WEST
P. O. BOX 387 SALT LAKE CITY, UTAH

To obtain faster penetration, straighter holes, fewer round trips and better diamond usage, call the Christensen representative nearest you for additional information about diamond bits and core barrels engineered for your job.

Like Convair's mighty Atlas missile,

Rector

casing heads are "SEALED WITH STEEL"



The mighty Atlas missile is built to withstand all extremes of temperature change, from searing heat developed in the combustion chambers to extreme low temperatures encountered hundreds of miles from the earth in outer space.

The same welding principle that insures strength and safety in this giant of the rocket age, insures a perfect completion every time in Rector casing heads. Rector casing heads utilize a precision ground joint seat fitted with a welding ring which is welded directly to the casing. An API ring gasket completes the exclusive *ring of steel* pioneered by Rector.

See your Rector representative or your favorite supply store.

PESA

MONOGRAMMED EQUIPMENT CERTIFICATE NO. 2158

Rector

WELL EQUIPMENT CO., INC.

Making the Oil Industry Safer!

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HONEYWELL'S NEW C7012A

Ultra-Vision* Flame Detector

senses only the flame!

no more hot refractory hold-ins

USE OF ULTRAVIOLET RAYS REVOLUTIONIZES SAFETY STANDARDS IN FLAME DETECTION DEVICES FOR GAS, OIL AND COMBINATION GAS-OIL INSTALLATIONS

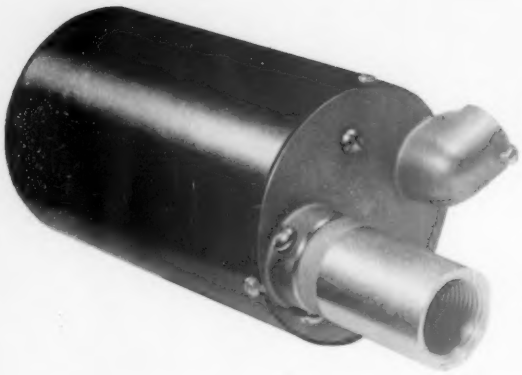
Honeywell's new ultraviolet sensor represents a major breakthrough in scientific flame detection. This revolutionary device employs an amplified ultraviolet signal to positively distinguish between an actual flame (ultraviolet rays) and a hot refractory (infrared rays). For the first time, you can be *absolutely sure* that fuel delivery will be stopped in the absence of flame.

This new control device is compact. It simplifies flame supervision of both single and multiple burners since the Ultra-Vision Detector, not being sensitive to a hot refractory, can be aimed at each individual flame in the most convenient way. This is the only device on the market that offers you this advantage.

Is it economical? Consider this: The amazing new Ultra-Vision Flame Detector will actually pay for itself in simplified installation and maintenance because—

• wiring is less expensive in this system than in a lead sulphide cell • it can be installed easier because in flame sighting hot refractory can be ignored • there is no further need for flame rod replacement.

*Trademark



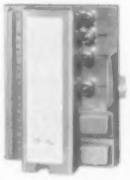
HONEYWELL'S NEW C7012 IS "SYSTEM ENGINEERED" FOR USE WITH ANY 2- TO 4-SECOND FLAME RECTIFICATION RELAY!

The Honeywell Ultra-Vision Flame Detector is designed for safe, foolproof flame detection when used with any of the following flame safeguard relays:

FOR MEDIUM BURNERS—RA890E PROTECTORELAY
The RA890E is a basic rectification relay ideally suited for use with the new C7012A Ultra-Vision Sensor. It's designed especially for pressure-gun oil burners, small combination gas-oil burners and gas-power burners.

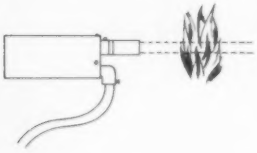
FOR INDUSTRIAL PROCESSING BURNERS AND OVENS—W124 PROTECTOGLO
Provides extended purge timings and cutoff of the main flame. Pushbutton and signal lights are a built-in feature of this system. The Ultra-Vision Flame Detector provides safe, dependable flame detection when used with the W124 Protectoglo.

FOR INDUSTRIAL PROCESSING AND COMMERCIAL BURNERS (requiring manual start and complete cutoff on flame failure)—R485 PROTECTORELAY
Used with the new C7012, the R485 Protectorelay insures trouble-free operation and no "down time"—this system senses only the flame, never a hot refractory. The safety features of the R485 include a warm-up timer, a self-start check and a safe-operation check for immediate shut-down in event of abnormal conditions.

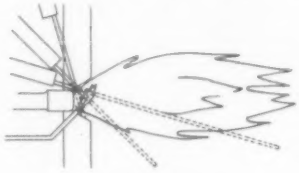


FOR LARGE CONVERSION BURNERS—R478 PROTECTORELAY
Here's an electronic programming relay for large horizontal rotaries, combination gas-oil burners, steam-atomizing burners and large power gas burners. The R478A may be used with the C7012A Ultra-Vision Sensor when burner sequencing is needed.

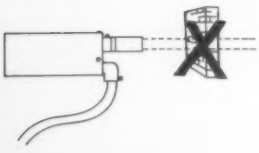
HERE'S WHY HONEYWELL'S NEW C7012 IS SO VERSATILE!



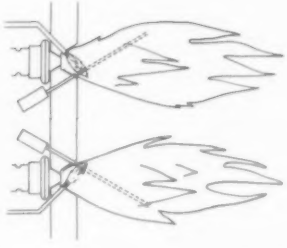
New Ultra-Vision Flame Detector sights flame of all fuels.



New Detector does an effective job on single burner pilot and main flame installations.



C7012 is not affected in any way by a hot refractory.



With Honeywell's new C7012, multiple burner installations can be monitored safely for the first time.

FOR MORE DETAILS, CALL YOUR LOCAL HONEYWELL OFFICE, OR WRITE TO HONEYWELL, MINNEAPOLIS 8, MINNESOTA; PHILADELPHIA 44, PENNSYLVANIA; OR TORONTO 17, ONTARIO

Honeywell

First in Control

76-4968 Printed in U.S.A.

Now "PACKAGED" AUTOMATION of Valve Operation, with LimiTorque

Minimize use of these costly components!

- Separate push button stations
- Separate reversing controllers
- Control racks
- Conduit runs, conduits
- Enclosures, piping, wiring
- Labor required for above items

Saves 50% on Equipment & Installation costs

Once again LimiTorque is first . . . LimiTorque valve operators now offer integral mounted NEMA rated reversing controllers, push button and indicating light elements. You can actually reduce the installation and component equipment costs up to 50%.

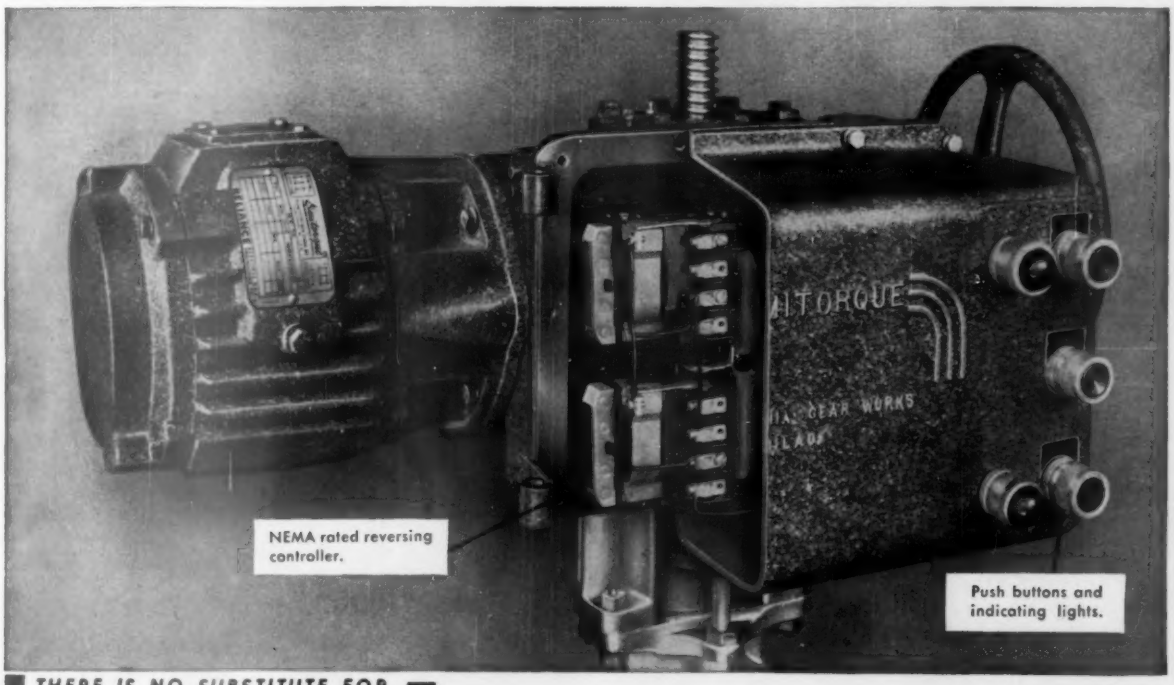
Various combinations of control items can be included in the same switch compartment. Eliminate costly separate control components when they are obtainable completely wired in your LimiTorque.

To compensate for temperature ranges, overloads are adjustable from 85% to 115% of the heater rating.

Push button elements, selector switches, etc., when required, are mounted in the hinged cover for quick, easy accessibility to all control components. LimiTorque can be field mounted on your existing valves. Contact your valve manufacturer or closest LimiTorque sales engineering office.

Remember, today's trend is toward low cost simplicity. LimiTorque operators with integral controls are designed with this in mind.

Write for further information.



THERE IS NO SUBSTITUTE FOR

LimiTorque®

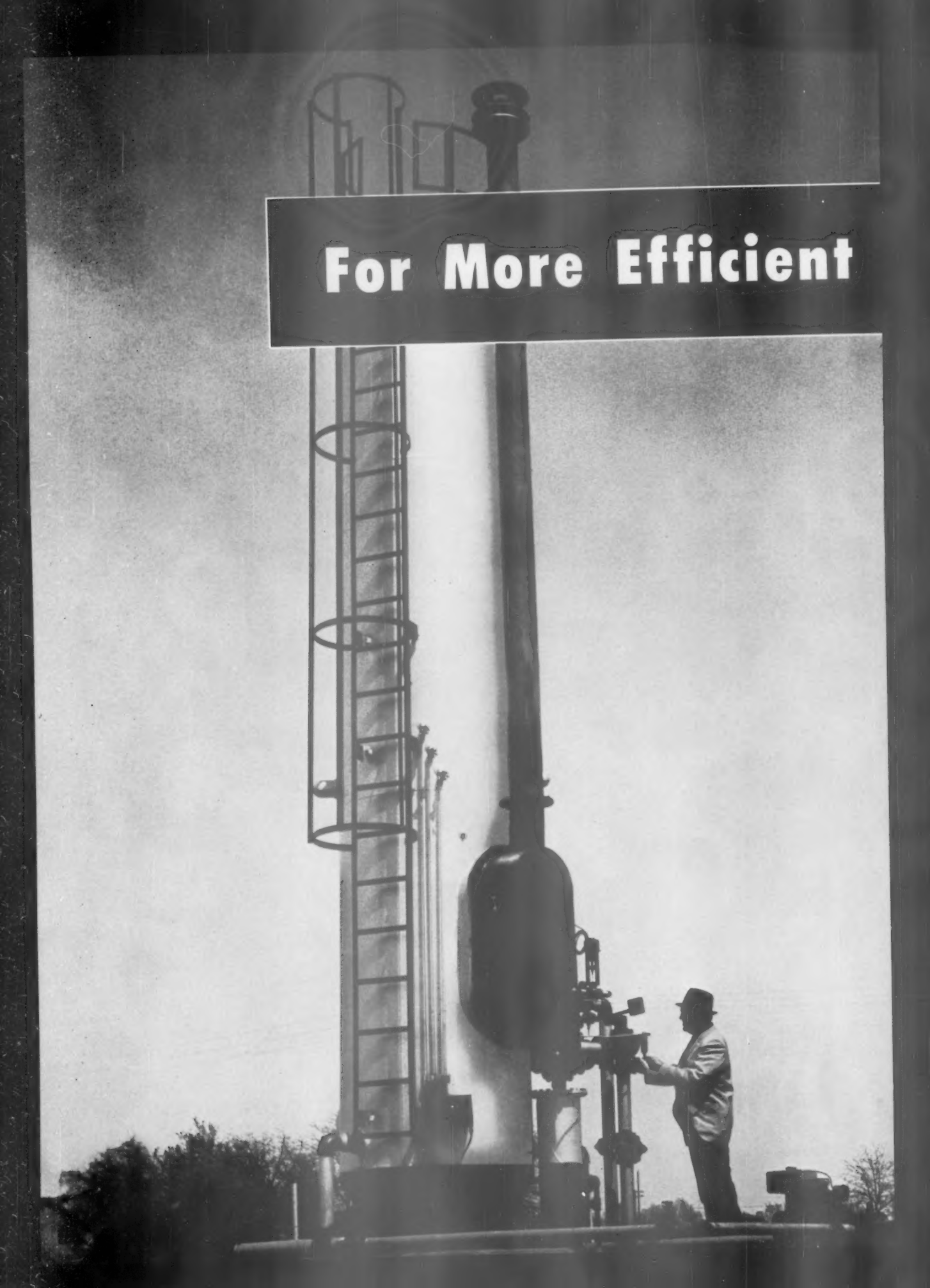
PHILADELPHIA GEAR CORPORATION

KING OF PRUSSIA (SUBURBAN PHILADELPHIA), PA.

Offices in all Principal Cities

INDUSTRIAL GEARS & SPEED REDUCERS • LIMITORQUE VALVE CONTROLS • FLUID AGITATORS • FLEXIBLE COUPLINGS

Limitorque Corporation • King of Prussia, Pa.


For More Efficient

Cold Weather Treating

The *Continental Type PHC Cold Weather Treater* has been designed for more positive treating and longer service life.

As shown in the flow diagram at the right, a cover over the fire tubes provides a pre-heated settling-out area. This exclusive design feature keeps silts and solids away from the fire tubes. There is no insulating deposit on the fire tubes to reduce their efficiency and lead to early tube burn-out.

Connections at the base make the *Continental PHC Treater* easier to install and maintain.

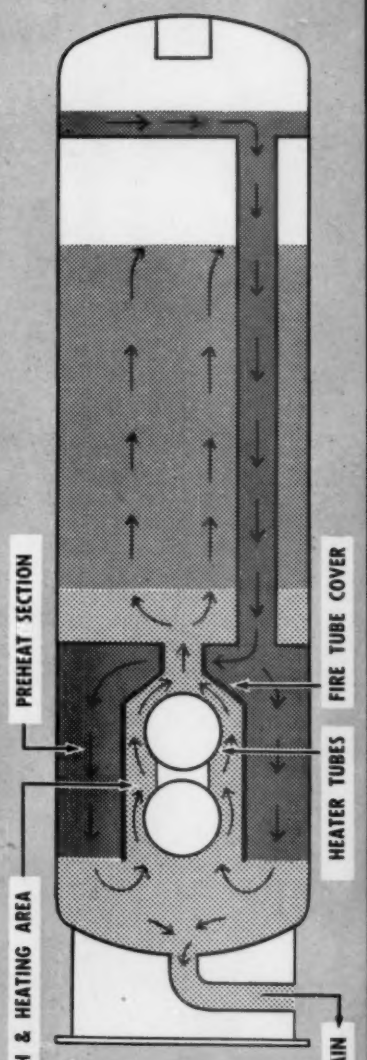
Oilmen in the Rocky Mountains, Canada and other cold climates will appreciate the special features of the *PHC Treater* for cold weather operation.

Your J&L Supply man has helpful information about Continental storage and processing equipment suitable for *any* lease in *any* climate. Call him now!

Jones & Laughlin

SUPPLY DIVISION – Tulsa

If it's sold by J&L....
it's the best available



FLOW DIAGRAM • CONTINENTAL PHC TREATER

We've matched a transformer with a motor to cut your oil well pumping costs

You can reduce the costs of electrified oil well pumping by putting this Wagner motor and transformer oil well pumping "package" to work on your wells.

The light-weight pole-mounted service transformer is matched to its motor load—puts an adequate, dependable power supply close to the load. You can electrify leases by bringing the high voltage line to each oil well installation . . . operate each well individually. You save up to 25 percent in line materials and labor—eliminate many dead ends—reduce system losses by as much as 65 percent.

The Wagner motor is engineered specifically for oil well pumping. It has plenty of torque to handle heavy initial loads without laboring or stalling. Its high slip (carefully determined by field tests) enable it to run smoothly under cyclic loads. Class B insulation protects the motor windings, gives greater thermal capacity to absorb the heat from peak loads. It consumes fewer kilowatthours per barrel because of its efficient operation in its specific job. These motors are built in ratings of 5 hp and larger.

Your nearby Wagner field engineer will be glad to tell you about the Oil Well Pumping Motor and Transformer "Package", help you plan oil well pumping, gathering and water-flooding systems, assist you in solving your electrical problems. Call him today, or write for Bulletin EU-426A.

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

Wagner Electric Corporation

6400 PLYMOUTH AVE., ST. LOUIS 33, MO.

SERVING 2 GREAT GROWTH INDUSTRIES— *ELECTRICAL • AUTOMOTIVE*

How to save money when you buy heads

A number of suggestions that may help you to reduce costs are contained in our new folder "Pertinent Facts on Purchasing Flanged and Dished Heads." Factors that govern the price of heads are described, and a list of the required data for orders and inquiries is included. Ordering from our stock sizes at Sparrows Point, Md., may save you time and money; a full list is contained in the folder. A copy is yours for the asking at any Bethlehem sales office.

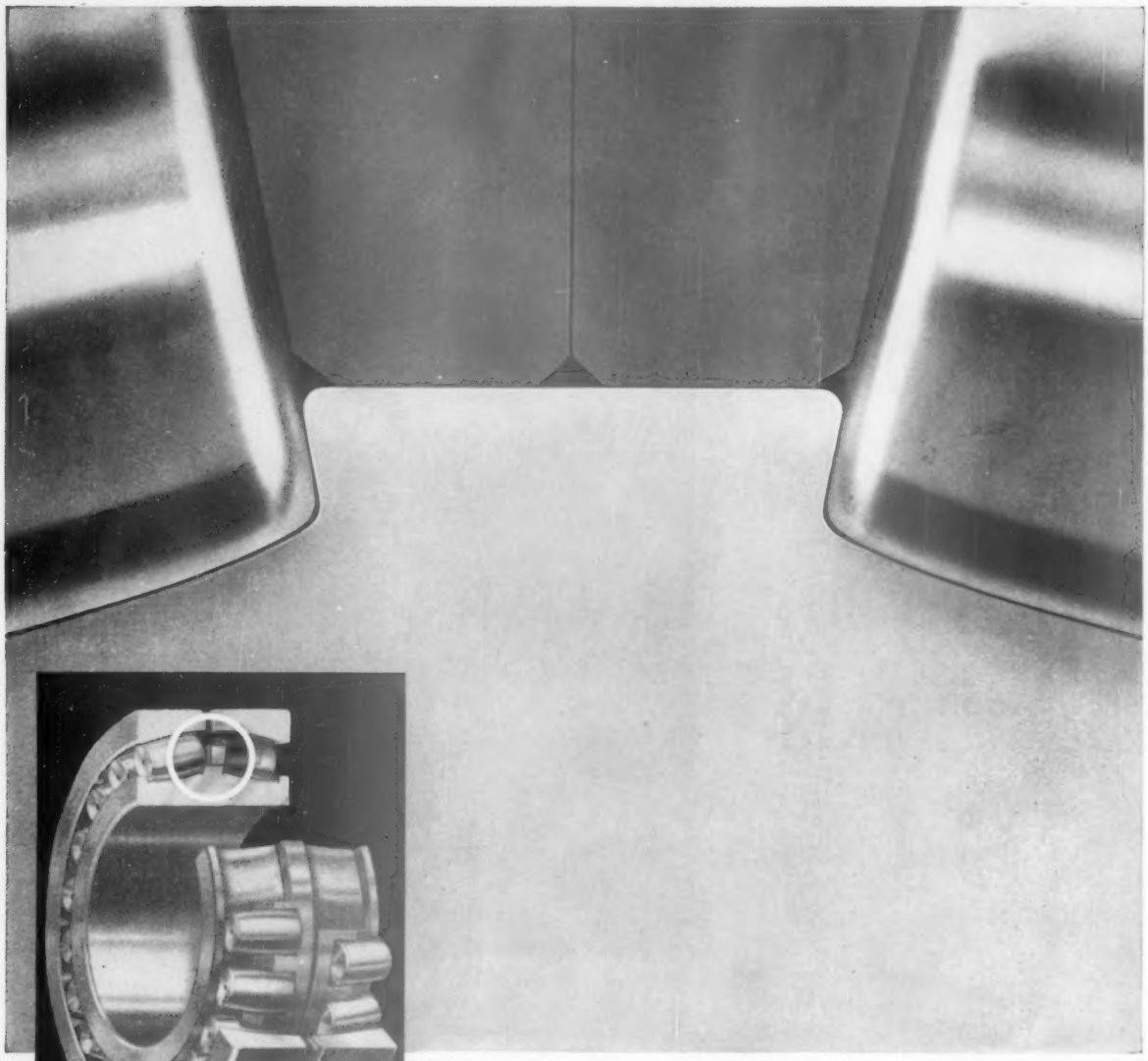
Bethlehem makes flanged-and-dished heads to meet virtually every requirement: ASME Code, elliptical and standard flanged-and-dished. Also flanged-only, dished-only, shallow-dished, double-dished, and heads for special requirements.

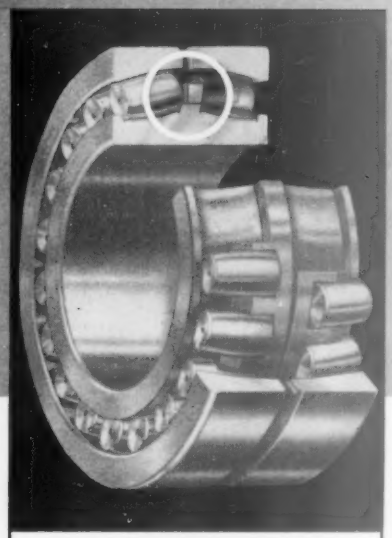
Bethlehem heads are available in diameters up to 144-in. —and in thicknesses from 14 gage to 2½-in. We also produce standard manhole and hand-hole saddles, covers and fittings, as well as heads with flued openings. A number of sizes of ASME Code flanged-and-dished heads are stocked for prompt delivery.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL





TORRINGTON
Spherical Roller Bearings Offer:

- inherent self-alignment
- conformity of rollers to raceways
- integral center guide flange for stability
- positive roller guidance
- land-riding bronze cages
- maximum radial and thrust capacity
- controlled internal clearance
- electronically selected rollers
- even load distribution
- long, dependable service life

Send for new Torrington Spherical Roller Bearing Catalog #258.

Keystone of Stability!

The integral center guide flange of the *Torrington* Spherical Roller Bearing provides *positive* roller guidance—the one best way to insure operating stability under radial and thrust loads.

Center guide flange surfaces and roller ends are ground to a common spherical radius. The asymmetrical roller seeks this flange under load, bearing lightly but constantly against it. Roller wobble and skewing are eliminated, and stress concentrations leading to early failure are avoided. Bearing operation is cooler, quieter and smoother.

The integral guide flange is adapted from the same principle used in the design of Torrington Tapered Roller Bearings. It is an engineering refinement, based on experience in all types of applications, that insures outstanding performance in your equipment. **The Torrington Company, South Bend 21, Ind.—and Torrington, Conn.**

TORRINGTON BEARINGS

Every Basic Type of Anti-friction Bearing

SPHERICAL ROLLER • TAPERED ROLLER • CYLINDRICAL ROLLER • NEEDLE • BALL • NEEDLE ROLLERS • THRUST

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They Say—

Journal action applauded

Dear Sir:

I am much interested and thoroughly approve of the Journal's action in urging a revision of rules and regulations relating to the drilling of wells and the production of oil and gas (OGJ, Jan. 18, "Why Conservation Rules Need an Overhauling," p. 39).

The recent granting by the Railroad Commission of Texas of a permit to drill a costly well on a town lot, which will certainly allow the operator to produce gas that exists under the property of others, is a good example of the need for constructive action.

The domestic oil and gas industry cannot prosper under such conditions and, as a matter of fact, it cannot afford such wasteful extravagance.

Paul D. Torrey
Petroleum Engineer and Geologist
Austin, Tex.

License wouldn't cure all

Dear Sir:

Your recent article on registration of geologists serves well to focus attention on the "pros" and "cons" of this difficult problem (OGJ, Jan. 4, p. 52).

Registration of geologists will be no panacea for the various difficulties with which the profession is beset. The fundamental solution to problems of professional status, professional ethics, employment, and related matters rests with the profession itself.

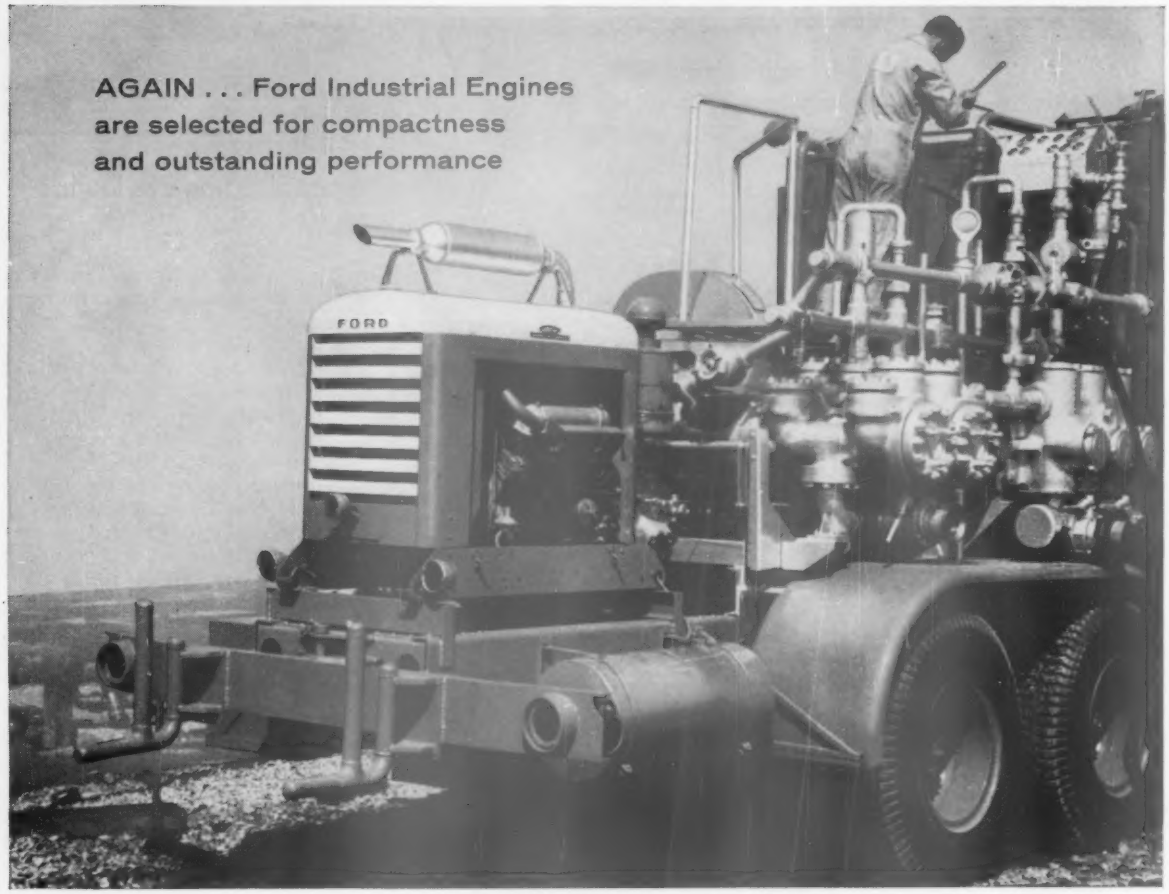
Professional stature must be attained through higher standards of education, greater sense of moral responsibilities, and stronger professional pride. Licensing of geologists might contribute in some measure to achieving these objectives, but the real burden of performance rests upon the profession—individually and collectively.

Robert C. Stephenson
Executive Director
American Geological Institute

It's everybody's problem

"Profit is the money which the company uses in its long-range program of growth. Without profit, there is no money left to stimulate this growth through investment in new properties, new construction, new methods, and new employes.

"In 1958 taxes on profits of corporations furnished some $20 billion



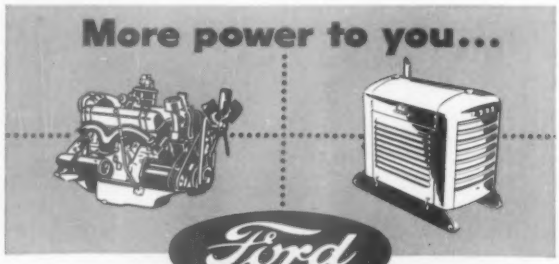
This oil well servicing unit was designed by BJ Service, Inc., Long Beach, Calif., Division of Borg-Warner

Powerful but lightweight Ford engine helps new cementing rig keep within road weight limits!

There's no place for "dead weight" on an efficient piece of equipment like this oil well servicing unit—designed by BJ Service, Inc. That's one big reason BJ Service chose a Ford 332 Power Unit as an important power component.

Don Kliment, manager of manufacturing for BJ Service, says, "Our equipment is extremely heavy . . . usually barely within road weight limitations. We found this particular Ford engine to be exactly what we needed, inasmuch as it supplied the needed power yet was light enough to meet our specs. The fact that it's a good serviceable engine, plus excellent availability of parts, also helped swing us to Ford."

You, too, can enjoy the proven dependability, greater operating efficiency and economy that come with Ford power. Ford engines are available in a wide variety of models—ranging from 134 to 534 cubic inches . . . including two modern Ford Diesels. To get the most for your power dollar, specify Ford engines—*the engines that give you more horsepower per pound of weight than ever before possible.*



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of income to the federal Government, about a fourth of the revenue.

"Out of every $100 that a corporation earns, it must pay $52 in corporation income taxes.

"Most of us figure that corporation taxes are someone else's problem. Maybe that's because individuals never pay them directly. But there's more involved than that.

"In all this tax talk, the word 'corporation' is made to sound like something separate from the individual—an impersonal entity from which funds can be siphoned without affecting anyone in particular.

"A corporation does not pay taxes. It merely collects taxes for the Government. People pay the taxes—employes, customers, stockholders!

"So if business taxes and expenses cut profits down to the point of diminishing return, those who levy taxes on corporations are going to have to find some other method of finding federal revenue."

Paul E. Taliaferro, president, Sunray Mid-Continent Oil Co., in an article in the Sunray News, company magazine.

A world problem

"With oil reserves and production growing faster than consumption, and with warnings of new price wars in the air, it would seem that the time has come for the free nations to get together on a world oil policy that would avert ruinous competition."

Editorial in the New York Times.

Joiners should be workers

"The recent decision of a major company to withdraw its support from all trade associations, including API, merits due consideration by all of us.

"Similar decisions by smaller companies have obviously been made regularly through the years with the result that a great many independent producers fail to participate.

"What is the reason for this attitude of withdrawal? In a great many cases, I suspect, it's confusion on the part of the officials who made the decision not to participate.

"Some of them have the notion that an association is supposed to do something directly for them.

"We have cases constantly of individuals expecting TIPRO to join in some of their legal and administrative scuffles merely because they are members of the association or because they are engaged in a struggle with a major company which is not eligible for membership.

"We have to be certain there is in-

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Cross-section of conventional and 45° bevel type Pumcups.

Darcova Pumcups are available in various types and textures, in a complete range of sizes, to provide unequalled efficiency and long life in reciprocating pumps, air or hydraulic mechanisms.

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★ less maintenance

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Darcova Pumcups make the *most* of the cup packing principle. And, they are made in a complete range of sizes, types and texture-engineered compositions for various pressure-temperature-fluid conditions. Pumcups hold peak efficiency for the life of the cups and outlast other packing as much as 3 to 1.

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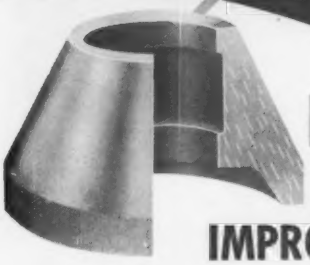
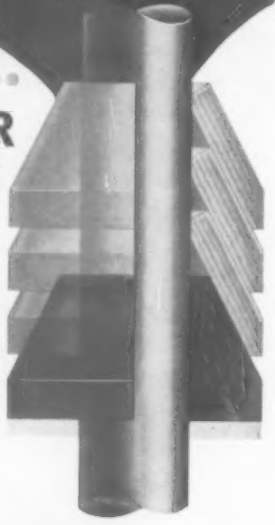


NOW... ANOTHER IMPROVEMENT



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a type for EVERY requirement

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volved in any issue in which we engage a principle applicable to the industry as a whole, or our independent producer and royalty owner segment of it. Opinions may differ on this point.

"Never will there be universal agreement that a particular organization is doing a good job or is necessary to the welfare of its members. Indeed, there is room to question the contribution of some organizations.

"But where that is true, it is usually a sign that the membership itself is failing to give sufficient time and attention to make the organization what it should or could be.

"The best way to improve is not to withdraw and criticize, but to get in and fight for changes. Most associations are democratic if nothing else."

Harry C. Jones, president, Texas Independent Producers and Royalty Owners Association, in an article in the TIPRO Reporter.

Letters to They Say should be addressed to The Editor, The Oil and Gas Journal, Box 1260, Tulsa, Okla.

CALENDAR

FEBRUARY

18 Chemical Institute of Canada, protective coatings division conference, Toronto.
19 Chemical Institute of Canada, protective coatings division conference, Montreal.
21-24 American Institute of Chemical Engineers, meeting, Biltmore Hotel, Atlanta.
24-25 Wisconsin Petroleum Association, annual convention and exhibit, Schroeder Hotel, Milwaukee.
24-25 Oklahoma State University, technical conference on natural gas engineering, Stillwater, Okla.
25 American Chemical Society, Delaware Valley region petroleum symposium, Philadelphia.
24-26 National Association of Corrosion Engineers, Tulsa section, eleventh annual corrosion short course, Mayo Hotel, Tulsa.
26 Natural Gasoline Association of America, Permian Basin regional meeting, Lincoln Hotel, Odessa, Tex.
26 Ohio Oil and Gas Association, winter meeting, Deshler-Hilton Hotel, Columbus, Ohio.

MARCH

2-4 American Petroleum Institute, Division of Production, southwestern district meeting, Statler-Hilton Hotel Dallas.
3-4 American Gas Association, Pacific Coast Gas Association, joint public relations conference, Biltmore Hotel, Santa Barbara, Calif.
4 Southern Gas Association, transmission management conference, Jung Hotel, New Orleans.
6-9 American Society of Mechanical Engineers, gas turbine power and hydraulic conference, Rice Hotel, Houston.
7 Canadian Petroleum Associaton, annual general meeting, Hotel Palliser, Calgary.
7-8 University of Florida, annual heat

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in your sucker rod pumps

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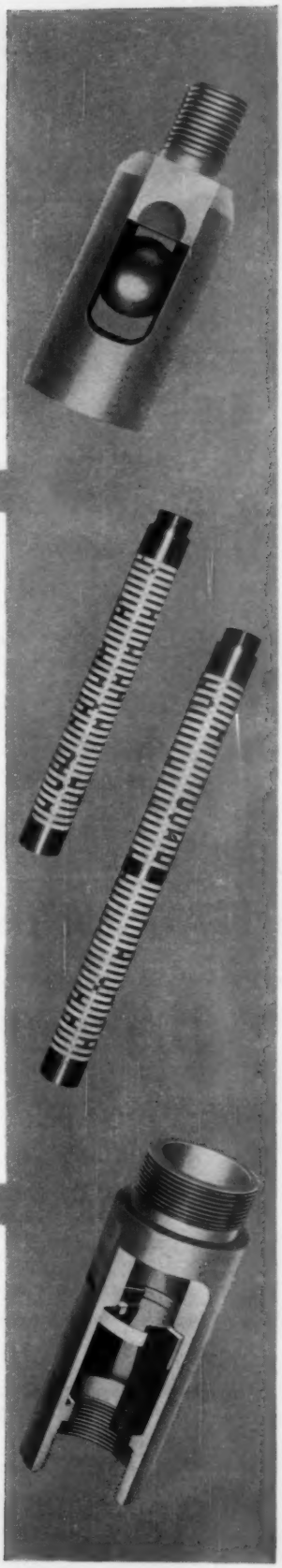

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For the **REPLACEABLE RUBBER GUIDES** in cages, **oil resistant** synthetic rubber is used. No swelling can be tolerated here. **Resilience** completely eliminates the beating action of the ball, and greatly increases ball life. **Resistance to abrasion** reduces wear on both guide and ball.

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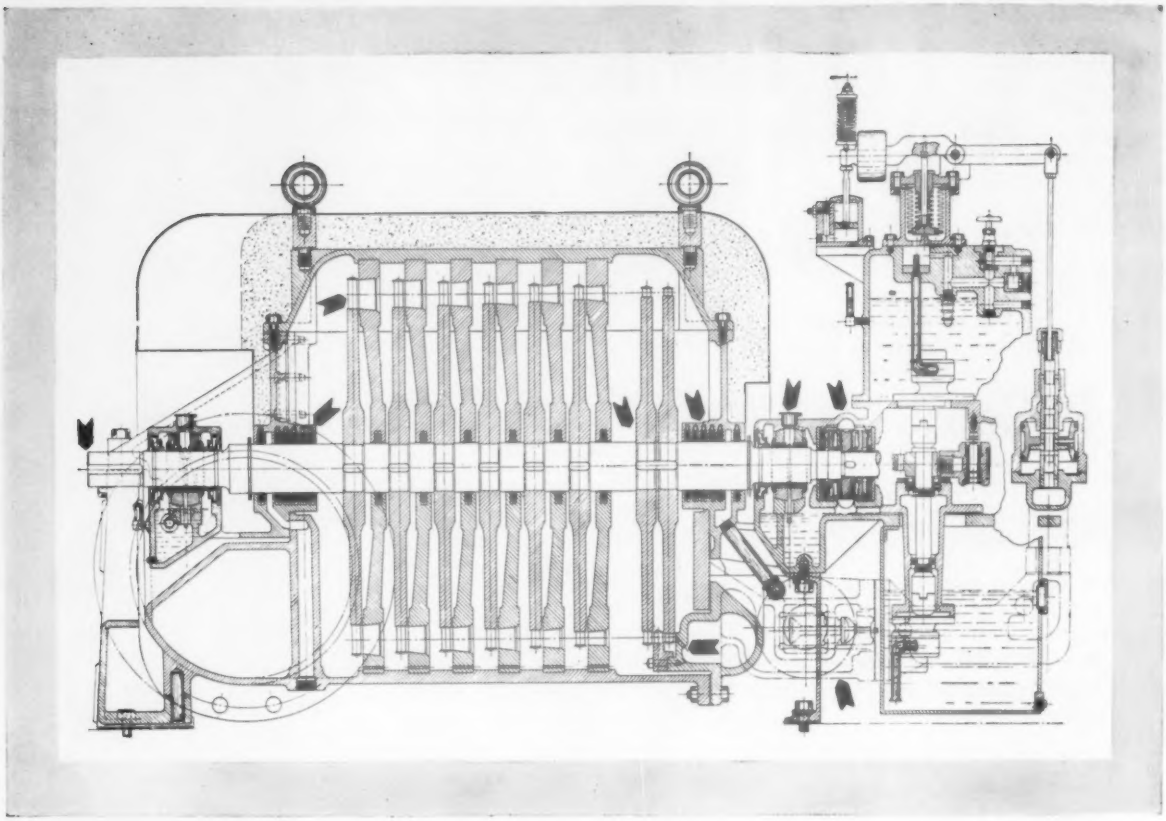

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transfer symposium, Engineering and Industries Building, Gainesville, Fla.

11 American Institute of Chemical Engineers, Sabine area section; American Chemical Society, Texas-Louisiana Gulf section, seventh annual joint technical meeting, Lamar State College of Technology, Beaumont, Tex.

14-18 National Association of Corrosion Engineers, sixteenth annual meeting, Memorial Auditorium, Dallas.

16 Petroleum Equipment Suppliers Association, eastern district membership meeting, Duquesne Club, Pittsburgh.

16-18 American Petroleum Institute, Division of Production, southern district meeting, Hilton Hotel, San Antonio.

18 Natural Gasoline Association of America, Oklahoma regional meeting, Biltmore Hotel, Oklahoma City.

21 University of Texas, school of gas technology, sixth semi-annual term, Kilgore College, Kilgore. Term ends April 29.

21-23 Midwest Gas Association, annual meeting, Hotel St. Paul, St. Paul.

22 Petroleum Equipment Suppliers Association, Gulf Coast district membership meeting, Shamrock Hilton Hotel, Houston.

24-25 New England Gas Association, annual meeting, Hotel Statler-Hilton, Boston.

25-26 North Texas Oil and Gas Association, thirtieth annual meeting, Kemp Hotel, Wichita Falls, Tex.

28 University of Texas, American Petroleum Institute Division of Transportation, school of pipeline technology, eighth semi-annual term, Lee College, Baytown, Tex. Term ends May 6.

28 University of Texas, American Petroleum Institute Division of Production, institute on automatic production controls, first term, Odessa College, Odessa, Tex. Term ends May 6.

28-30 Western Petroleum Refiners Association forty-eighth annual meeting, Hilton Hotel, San Antonio, Tex.

29-31 American Power Conference, annual meeting, Sherman Hotel, Chicago.

30-Apr. 1 American Petroleum Institute, Division of Production, Mid-Continent district meeting, Broadview Hotel, Wichita.

APRIL

3-8 Engineers Joint Council, sixth nuclear congress, New York.

4-7 Oil Heat Institute of America, annual convention, Park-Sheraton Hotel, New York.

4-7 National oil heat and air-conditioning exposition, Coliseum, New York.

5 Petroleum Equipment Suppliers Association, southern mid-continent district membership meeting, Statler-Hilton Hotel, Dallas.

5-6 University of Kansas, eighth annual gas compressor institute, National Guard Armory, Liberal, Kans.

5-7 Instrument Society of America, national chemical and petroleum instrumentation symposium, Rochester, N. Y.

7-8 Rocky Mountain Oil and Gas Association, midyear meeting, Newhouse Hotel, Salt Lake City.

8 Chemical Institute of Canada, rubber chemistry division, annual meeting, Kitchener, Ont.

12-14 Petroleum Industry Electrical As-

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Where pollution and waste-disposal are problems, the activated sludge process has been recognized generally as the most effective way to make effluents suitable for discharge into streams, sewers, etc.

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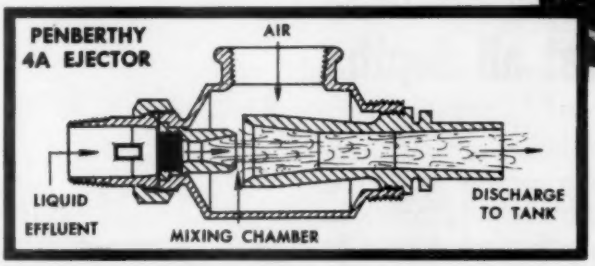

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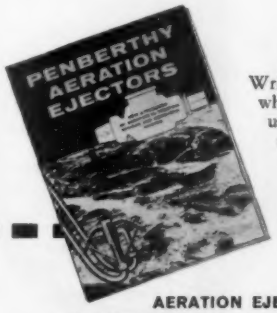

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CEMENTING DATA

Job — Clemile Savoy #1, Vermillion Parish, Louisiana

Owner — Continental Oil Company, Houston

Contractor: Dillard-Waltermire, Inc., Houston

Job #1 — 11,030′ of 9⅝″ O.D. casing cemented in 12¼″ hole with 1,000 bags neat UNAFLO cement. Slurry fillup behind casing 3,130′. Drilling mud wt. 11.5 lbs/gal. Schlumberger temp. log 168° F. Est. static BHT 193° F.

Job #2 — 1,298′ of 7″ O.D. liner set in 8¾″ hole from 10,910′ to 12,208′, cemented with neat slurry 220 bags UNAFLO. Drilling mud wt. 16.2 lbs/gal. Schlumberger temp. log 196° F. Est. static BHT 226° F.

Job #3 — Squeezed top 7″ O.D. liner with 300 bags neat UNAFLO. Final pump truck pressure 2,000 psi.

Job #4 — Squeezed 150 bags Cealment (UNAFLO plus latex) through retainer set at 12,182′ into lost-circulation zone below 7″ O.D. liner.

Jobs #5, 6, 7 — Bradenhead squeeze jobs using 100 bags; 150 bags; 150 bags Cealment respectively into lost circulation zone at 12,350′. Final pressure 400 psi.

Job #8 — 2,725′ 4½″ O.D. liner set in 6″ hole from 12,017′ to 14,742′ cemented with 300 bags UNAFLO weighted (18 lbs/gal.) with HiDense #2 (Ilmenite Ore). Mud wt. 18.4 lbs/gal. Est. static BHT 284° F.

Job #9 — Full string of 7″ O.D. casing tied into top of 7″ O.D. liner at 10,910′, cemented with 50 bags neat UNAFLO.

Universal Atlas Cement
Division of
United States Steel

sociation, Petroleum Electric Supply Association, conference and exhibition, Municipal Auditorium, Kansas City.

15-16 Society of Economic Paleontologists and Mineralogists, Pacific section, annual spring field trip, Panoche Hills, San Joaquin Valley, California, and evening meeting, The Hacienda, Fresno, Calif.

19-21 University of Oklahoma, College of Engineering, southwestern gas measurement short course, north campus, University of Oklahoma, Norman.

20 Chemical Institute of Canada, joint meeting, Quebec rubber and plastics group and Montreal section, Queen's Hotel, Montreal.

20-22 American Petroleum Institute, Division of Production, Rocky Mountain district meeting, Gladstone, Henning, and Townsend hotels, Casper, Wyo.

20-22 National Petroleum Association, semiannual meeting, Hotel Cleveland, Cleveland.

20-22 Oklahoma State University, technical conference on heat transfer, Stillwater, Okla.

21-22 Texas Technological College, seventh annual West Texas oil lifting short course, Lubbock, Tex.

21-23 Society of Economic Paleontologists and Mineralogists, Permian basin section annual meeting and field trip, Abilene, Tex.

24-26 Independent Petroleum Association of America, midyear meeting, Denver Hilton Hotel, Denver.

25-26 American Society of Mechanical Engineers, maintenance and plant engineering conference, Chase-Park Plaza Hotel, St. Louis.

25-27 Southern Gas Association, convention, Buccaneer and Galvez hotels, Galveston.

25-28 American Association of Petroleum Geologists, Society of Economic Paleontologists and Mineralogists, annual meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

25-29 American Welding Society, annual meeting and welding exposition, Los Angeles.

26 Petroleum Equipment Suppliers Association, Pacific district annual membership meeting, Ambassador Hotel, Los Angeles.

27-29 Natural Gasoline Association of America, annual convention, Rice Hotel, Houston.

28-29 American Petroleum Institute, Division of Transportation, pipeline conference, Mayo Hotel, Tulsa.

28-29 Pacific Coast Gas Association, distribution conference, Benson Hotel, Portland.

MAY

1-4 American Petroleum Institute, Division of Transportation, tanker conference, Seaview Country Club, Absecon, N. J.

2-3 Society of Petroleum Engineers of AIME, North Texas section, fourth biennial secondary recovery symposium, Wichita Falls, Tex.

5-6 American Institute of Mining, Metallurgical, and Petroleum Engineers, annual joint meeting of Rocky Mountain petroleum sections, Calgary.

5-6 Canadian Institute of Mining and Metallurgy, annual technical meeting of petroleum and natural gas division, Palliser Hotel, Calgary.

9-12 American Petroleum Institute, Division of Refining, midyear meeting, Statler and Sheraton-Cadillac hotels, Detroit.

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the Journal said...

50 years ago

February 20, 1910

What is believed to be the country's largest gas well blew in last week in booming Preston (Hamilton Switch) field, north of Okmulgee, Okmulgee County, Oklahoma. Neodesha Gas Pipe Line Co. and the Sinclair group, joint owners, estimate the flow at more than 40,000 M.c.f. daily.

Eyes of Gulf Coast oil men are turning to the promising Vinton prospect, just south of Vinton, in Calcasieu Parish, southwestern Louisiana, where five wildcat tests are drilling. Latest company to enter the play is Gulf Refining Co. Others drilling are Producers Oil Co., Brooks & Toler, and Hooks Co.

25 years ago

February 14, 1935

A wildcat discovery by Stanolind Oil & Gas Co. (Pan American Petroleum Corp.) in the Katy area of southeastern Waller County, Texas, opens what is expected to become one of the Gulf Coast's largest and most prolific gas-condensate fields. Discovery well (1 Thorp) flowed 3,180 M.c.f. of gas and 150 bbl. of 58°-gravity condensate daily through ¼-in. choke from upper Saline Bayou pay at 7,475 ft.

U. S. Congressman Martin Dies from Texas proposes that the federal Government buy all mineral rights in mammoth East Texas field, and convert the field to a petroleum reserve for the county's military forces.

10 years ago

February 16, 1950

First deliveries of natural gas through Texas Gas Transmission Co.'s new 800-mile, $73,500,000 pipeline from Texas are made to Texas Eastern Transmission Corp.'s Big Inch system at Middletown, Ohio. The gas will be distributed to utilities serving cities in Ohio, Pennsylvania, and upper New York.

Discovery by Carter Oil Co. last week of oil production from the basal Lower Cretaceous-Travis Peak (Houston) formation at Pickens, in Yazoo County, kindles new interest in Mississippi's deeper potentialities. Carter's discovery well, 1 Wilson, flows 200 bbl. daily from pay at 7,730-32 ft.

First test drilled by American Independent Oil Co. and Pacific Western Oil Corp., joint operators, on their Kuwait-Saudi Arabia concession is abandoned as dry at 5,020 ft. Joint contractors Kerr-McGee Oil Industries, Inc., and Brown Drilling Co. move to second location.

JOURNALLY SPEAKING

Anatomy of a Doodle

OH IF ONLY a murder had been committed, we thought as we sat through the dull court-room proceedings. With a little dramatic exaggeration we could twist this case into a suspense-packed whodunit and sell the movie rights to Hollywood.

But the trouble is that the alleged crime wasn't a juicy murder but a crude-oil price increase; the defendant wasn't a sexy blonde but 29 oil companies; and the evidence wasn't in the form of brilliant crossexamination but dry-as dust stipulation of documents.

The Government charged that the oil companies plotted together to raise the price of crude by concerted action during the Suez crisis 3 years ago. And most of the evidence consisted of records showing that (1) oil men were interested in crude prices, and (2) employes of the various companies telephoned each other a lot.

Of course the judge may think differently, but from a storywriter's viewpoint it seemed that the prosecution put on a pretty poor show. Many times during the trial something came up that would have made a wonderfully intriguing chapter heading for our book, but each one of them pooped out into a bunch of nothing. We couldn't even see a plot for a story, much less for a conspiracy.

For instance there was "The Case of the Doodled Diary." The FBI had got hold of a crude buyer's personal notebook full of jottings about crude prices and telephone conversations with the crude-oil men of competing companies and also a lot of mysterious and undecipherable symbols. It looked very cabalistic and incriminating.

But when the legal skirmishes were over and the diary was admitted as evidence, the man who wrote it explained that it was simply notes he made while transacting routine business by telephone, and he proved that each one of the calls to a competitor was a legitimate deal to buy or sell a specific batch of crude at a particular price and had nothing to do with a general price increase. Those secret cryptograms?—Just doodles he always made while phoning.

Then there was the damning evidence of "The 1-2 Entry." Humble raised its crude price on January 3, and the other companies all claimed that they had no advance knowledge of it. But in the telephone notes of the crude-oil man of another company there appeared the figures and areas of Humble's increase together with the figures "1-2." This, the Government alleged, was proof of collusion.

But the poor son of a gun who wrote that note swore that he didn't know about Humble's price raise until January 3, and explained that the entry was jumbled in with a lot of other telephone scribblings he had made that week, and that if the "1-2" was a date it was an error he couldn't account for.

Then there were the mysterious-sounding "Jurenev Papers" that the prosecutors fought hard to get in evidence. But they turned out to be a file of weekly intracompany market analyses in which a staff economist kept telling his bosses that the price of crude oil ought to go up to cover rising production costs. Proof of a long-planned conspiracy? We couldn't see any movie scenario there.

"The Duck-Call Incident" looked like a red-hot chapter for a while. The Government showed that the crude-oil man of one of the alleged conspirators got a long-distance call from his counterpart in Humble the day before Humble raised its prices, and that he in turn phoned the crude-oil men of half a dozen of the other defendants. Aha, the soup begins to thicken—duck soup for the prosecution.

It was duck soup, too. With a whole sheaf of documents this man proved that the crude-oil men were conspiring to take a day off and go duck hunting later that week. They went, too, right at the time they were alleged to have been in their offices conspiring to raise the price of crude—and they shot a nice bunch of ducks. A fowl conspiracy, indeed.

Many other swell chapter headings were doodled on our note pad at the press table as the trial continued its listless plodding. But they remain just doodles. We'll never write that mystery thriller.

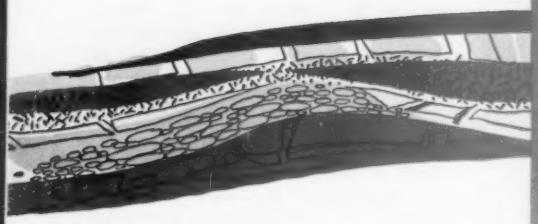
Maybe we don't have as much imagination as the D. A. in this case, but darned if we can see even the suggestion of a plot in the whole thing.

—Henry D. Ralph.

IF YOU WANT MORE* THAN A GOOD CEMENT JOB...

* *Casing on Bottom Safer and Faster*

* *Protection of Productivity*



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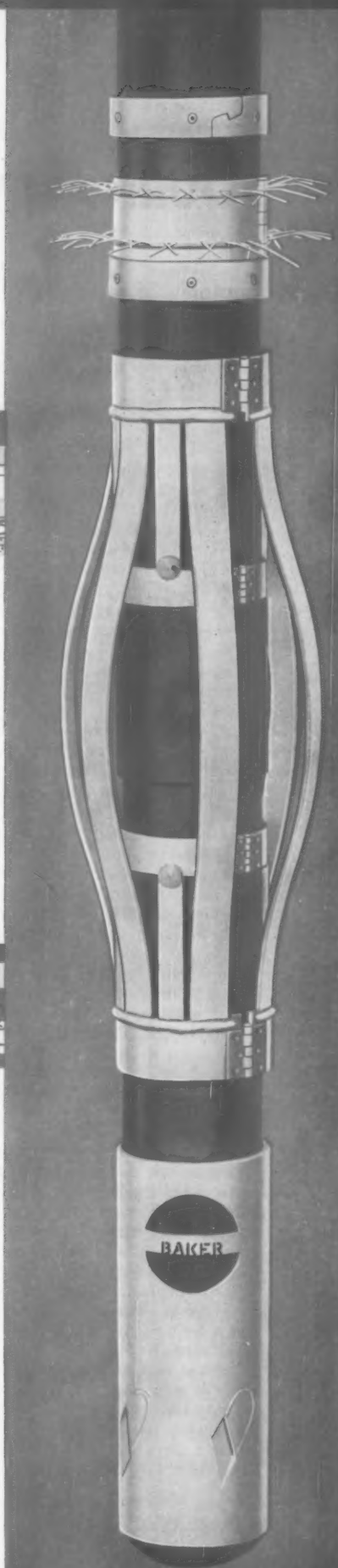

BAKER *Wall Scratchers*

... remove mud cake *only* from the cementing area. This "controlled scratching" protects productivity. No danger of "balled-up" mud on scratcher wires to plug the annulus with possible pressure surges, and "mudding-off" of production.

BAKER *Casing Centralizers*

... assure cementing clearance and do not remove mud cake to plug the annulus, contribute to pressure surges and restrict productivity. The "sled-runner" springs are pre-set to the optimum bowed height, and pass tight spots or dog legs without damage to the centralizer assembly. Their greater centering force maintains ample annular clearance for successful primary cementing.

BAKER *Fill-Up Equipment*

... saves time in running casing, but does not create pressure surges that restrict productivity. The Variable Valve in Baker DIFFERENTIAL or FLEXIFLOW "Fill-up" Shoes and Collars permits casing to fill from the bottom, and coordinates *rate of fill* with *rate of lowering* to AVOID high-pressure surges. Surface filling is eliminated, danger of stuck pipe is reduced, chances for successful cementing are increased.

The urge for volume is undermining oil prices

THE PRICE OF CRUDE OIL continues to deteriorate. With disturbing frequency, postings are lowered here and there, first in one area and then another.

Each cut is explained as due to local competitive conditions, or to bring a certain crude into line with the refining values of some other. And each cut starts a chain reaction that can undermine the price in another area.

There may be no dramatic across-the-board reduction of crude prices, but continuation of this trend will bring the same result. And there is nothing to suggest a reversal of the trend.

THE CAUSE OF THIS deterioration is the chaotic condition of the market for refined products. Products prices, net income from marketing operations, and refiners' realization are so low that refiners feel forced to reduce the cost of their raw material.

Crude-price reductions are made easy by the abundance of crude available. So it is disturbing to see prorating states inching up allowables toward the end of a mild winter and approaching the season of the lowest demand of the year.

But the primary cause of the industry's financial ill health is the headlong race of refiners and marketers to maintain and increase their volume of sales, particularly in gasoline.

There seems to be an almost universal determination never to be undersold, never to lose a customer by reason of price. So almost every offer to sell below the prevailing market quotation is pretty sure to be met by one or all competing suppliers.

Trade gossip is full of instances where this practice is carried to ridiculous extremes. Small-volume retail price cutters, or one-shot dumpings of distress products are allowed to bring down all prices over a wide area. In many cases such conditions could be confined to local or temporary extent by marketing maneuvers other than the defeatist attitude of fighting price cuts with price cuts.

There are even reports that sharp buyers can get discounts simply by dropping hints that some other supplier is about to lower his quotation. Such instances illustrate how weak and jittery the market is.

ALWAYS IN THE PAST there have been soft spots in the products market, but they usually stay local or clear up soon. Old traders say they have never seen a crumbling price structure so widespread or so prolonged as the present.

The only apparent solution is for top management of both big and little companies to switch from the policy of volume at any price to a policy of getting a reasonable and normal profit.

Photo by courtesy of Sperry-Sun Well Surveying Co.

They're getting the record fast . . . and right

No need to pull drill pipe out of the hole every time a magnetic survey is made. Their drill stem is equipped with a **non-magnetic drill collar.** Errors are not introduced by magnetism in the collar. This efficient tool was developed by the Sperry-Sun Well Surveying Company of Houston, Texas more than a decade ago.

What's a non-magnetic collar made of? "K" **Monel*** age-hardenable nickel-copper alloy! In addition to being **non-magnetic,** "K" Monel alloy has **high density, excellent strength** and **toughness,** and **good resistance to corrosion and fatigue.** When you get drilling equipment, make sure you're getting "K" Monel alloy collars. Then you'll get the record fast . . . and right.

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Did Government Prove Conspiracy?

• Quick windup of the Government's case brings immediate moves for acquittal by 29 indicted companies. Judge will decide whether prosecutors made a prima facie case after studying the full arguments.

BIGGEST question in the oil industry this week: "Did the Government prove 29 leading oil companies conspired to rig the 1957 crude-price increases?"

Justice Department lawyers quickly closed out their conspiracy case early last Wednesday morning in Tulsa district federal court.

Attorneys for the 29 oil-company defendants immediately filed with Judge Royce H. Savage motions for acquittal. They claimed the Government failed to make a prima facie case of conspiracy.

Arguments on the motions began last Friday. Attorneys for each defendant were allowed to make full arguments on the motion in their own behalf.

Answer to the big question and future of the trial rest with Judge Savage.

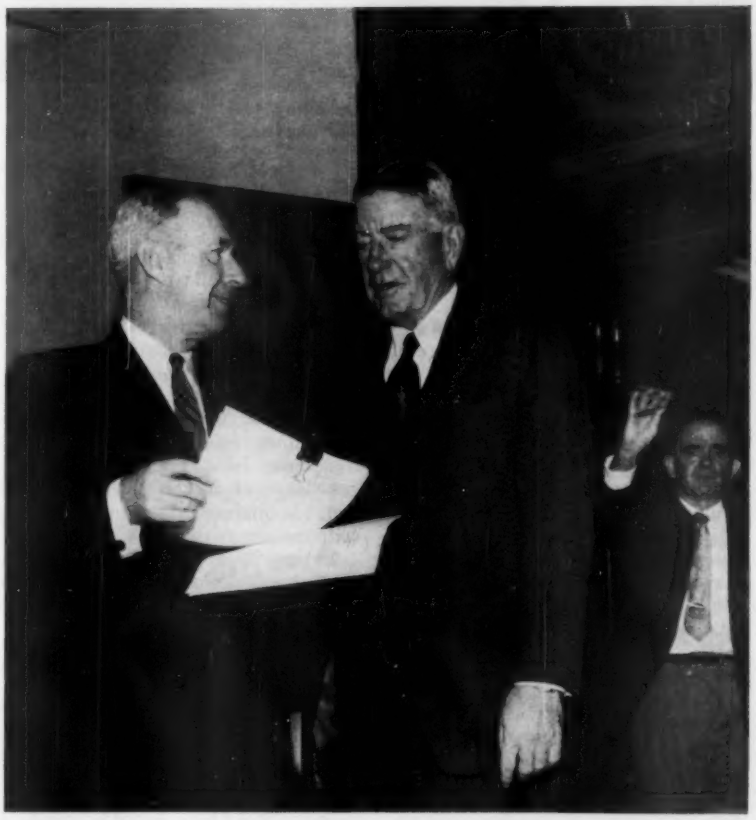
If he agrees with defense lawyers that the Government failed to prove a prima facie case, the oil companies will be acquitted.

If he rules for the Government, it means the oil companies then will have to put on witnesses and introduce documents aimed at disproving charges made by the Government.

Legal angles . . . Judge Savage pointed out several interesting legal questions while talking informally with lawyers in court over plans for arguments.

He said two questions had arisen in his mind concerning the case on which he would like to hear argument.

One is whether affiliated companies which agree to price increases violate the Sherman Antitrust Act. The other involves the possibility the court may find some four or five small conspiracies existed where affiliated companies agreed on prices. Since the indictment charged only one big conspiracy, the question then would be whether this constitutes a fatal variance.



CONFERENCE is held by Eugene Holman, right, Jersey Standard board chairman, with attorney Grant W. Kelleher just before Holman testifies in Tulsa oil conspiracy case.

Savage told the lawyers he is assuming the court's task is to reach a decision whether a prima facie case has been made of the one big conspiracy charge.

A classic . . . The speed of the government case surprised many of the lawyers.

They already had advanced the opinion that the case may go down as a classic in antitrust matters. Lawyers praised the pre-trial organization by Judge Savage and attorneys on both sides as cutting months off the litigation.

Joseph E. McDowell, the chief government attorney, believes the speed with which the Government presented its case will be a record breaker. He

Witnesses **TWO CONTINENTAL OIL** executives, Harry J. Kennedy, left, and Charles A. Perlitz, Jr., testified in Tulsa last week.

DIARY writers of Atlantic Refining, E. J. Henry, Jr., left, and J. E. Woolley, right, flank attorney Charles B. Cochran.

said this speed reflects the enormous amount of work done in advance.

"The handling of the gasoline price stipulations alone probably saved the introduction of 10,000 documents which otherwise would have been necessary," he said. In other conspiracy trials of comparable magnitude, the government's case has taken from 3 to 4 months or longer.

The Government case . . . The Justice Department team last week strived manfully to tie up all the loose ends of its case.

Government lawyers introduced more reams of documents and paraded before the court as witnesses FBI agents, telephone company representatives, and oil-company executives.

The strategy briefly was:

. . . **To use documents** showing the general economic background in the 1956-57 period did not justify a price increase for crude or products. Also the prosecution attempted to show the increases themselves, plus public comments of oil executives, fit a uniform pattern indicating concerted action.

. . . **To use witnesses** to show communication existed among the oil companies, that they had advance knowledge of each others' plans, and that the increases were made on a common design.

Defense attorneys managed to shoot big holes in the web of conspiracy but just how successful they were naturally awaits Judge Savage's decision on motions for acquittal.

Many of the lawyers felt the government witnesses added little to the government case; in fact, they may have helped the defense. These legal experts consider the government's case rests on documents, and they are optimistic they can refute these in arguments.

Agents and phone calls . . . The four federal agents testified to interviews conducted with executives of several oil companies.

The companies involved were Standard Oil Co. (Ind.) and its affiliates, DX Sunray Oil Co., Tulsa; Cities Service Oil Co., Bartlesville; and Standard Oil Co. (Ohio) in Cleveland.

It was difficult at times to determine whether the agents were government or defense witnesses. They

Lawyers **IN MADISON CASE,** Grant Kelleher, left, and Hammond Chaffetz were on government team. Both are on defense at Tulsa.

Thomas M. Scanlon
Ohio's legal spokesman.

John E. F. Wood
Continental's top man.

DUCK SHOOT host, Lion Oil's J. E. Howell, provided humorous highlight with accounts of his Arkansas outing.

PRICE decisions are not the province of crude-oil buyers, says Tidewater's crude manager, George W. Goad, Los Angeles.

testified generally that they questioned the executives and asked for all possible documents that might pertain to the price increases.

The oil company officials were quoted as saying their decision to increase prices during the Suez Canal crisis was made independently and was based on competitive factors. Executives also explained that the exchange of information was common practice in the buying and selling of crude oil.

The FBI agents were quickly followed to the stand by three officials of telephone companies in New York, Tulsa, and Shreveport, La. They authenticated nearly 500 telephone toll slips. These showed long distance calls were made between various companies during December 1956 and January 1957, the period the Government charges the firms conspired to raise prices.

Judge Savage interrupted proceedings to observe he doubted the evidentiary value of a major part of the government's evidence concerning the telephone slips.

The judge admitted them into evidence, however, observing:

"It is my view that these telephone records can't have any evidentiary value unless they can be connected by other testimony as to what the parties discussed. Stipulations have already been made to the effect that a lot of business is done over the telephone by companies engaged in the purchase and sale of crude oil.

"A phone slip indicating that a crude oil employe of one company had a conversation with his counterpart in another company can't be considered as indicating that the call involved an agreement as to the price of crude oil."

Executives on stand . . . Eugene Holman, Jersey Standard's board chairman, led a parade of oil-company executives to the witness chair.

The officials generally denied they had contact with any other company in a uniform plan to increase prices. Highlights of their testimony:

. . . Holman—said Jersey Standard President M. J. Rathbone called him from Louisiana late in December 1956 and reported Humble President Hines Baker had informed him that Humble was considering increasing prices. Holman said he relayed this

Leroy Jeffers
Leader of Gulf's team.

Edward F. Howrey
Quarterback for Socony.

SHELL'S LEGAL team in Tulsa includes Richard B. McDermott, left, and Paul H. Teetor.

ENJOYING a recess during the Tulsa trial are two Jersey lawyers, Hugh B. Cox, left, and Thomas E. Monaghan.

bit of information to Standard directors, but took no other action and discussed the information with no one outside the company.

...Harry J. Kennedy, senior vice president of Continental Oil Co.—said when he heard news of Humble's price increase he immediately advised the marketing manager under him to study Conoco's products price structure to see how the company would recapture the added cost of crude.

He testified his group had no connection with crude prices and that although he knew of staff price studies he did not know of any plans to raise Conoco's crude postings.

...Charles A. Perlitz, Jr., executive vice president of Continental—said company executives had discussed need for increases in prices of crude and products for years. Perlitz declared in his view price increases were desirable and advisable but added that Continental was "not on the verge of undertaking price increases on its own."

He explained a curious ending to a wire sent Continental President Leonard F. McCollum relaying news of the Humble price increase. He added in the wire that he had been unable to contact David Proctor, an official then of Gulf Oil Corp. Government attorneys had pointed this out as evidence of communication between Conoco and Gulf on the price issue. Perlitz, however, testified this had reference to a deal between Continental and Gulf for financing through their Canadian affiliates the Trans-Canada pipeline.

...P. H. DuVal, vice president of Arkansas Fuel Oil Corp.—said when he heard of Humble's increase he called officials of Esso Standard, Gulf, and Texaco to determine if these companies had taken any action. He explained his concern stemmed from this fact: He had some crude contracts in which prices were based on the average postings of several other companies.

...George W. Goad, crude oil manager of Tidewater Oil Co.—said crude-oil men are not at a company level where they know the intentions of management and aren't in a position nor have the authority to make an agreement on raising prices.

Diaries . . . An important document in the government case may well be a memorandum notebook kept by J. E. Woolley, a crude oil man for Atlantic Refining Co. in Dallas.

In the book, Woolley noted: "1-2, ave inc 35c over state, 25c in Pan & W.T. 40 & 45@ G. Coast."

The Government contended the "1-2" meant January 2 and showed Atlantic had a day's advance knowledge of Humble's price increase. This implied the firms entered into a conspiracy, and implicated every other firm noted in Woolley's diary.

Woolley testified the date in the notebook must have been in error. When Judge Savage asked why he had put down the note, Woolley said he must have learned about the price increase from someone in the company or from a newspaper, and put it down for his own use.

Woolley declared he was more certain about the error of the date now than when he testified before the federal grand jury in Alexandria, Va., because he was sure he had never received information from anyone on the increase before it was made public.

E. J. Henry, also an Atlantic crude buyer in Dallas, testified entries in his notebook about other companies only involved oil deals he had discussed with other crude men.

He explained several long distance calls made to other companies from his home were attempts to buy an emergency shipment of crude during the crisis. He added he was unable to buy any because of the tight supply.

Some quacks . . . One of the trial's humorous highlights was the details of an Arkansas duck shoot related by J. E. Howell, vice president of Lion Oil Co., a division of Monsanto Chemical Co.

The Government had called Howell to testify about a flurry of messages he sent other crude oil men during the critical December-January period. Howell explained the calls were invitations and replies to a duck shoot he had arranged at the Monsanto lodge at Stuttgart, Ark. for early January. They had nothing to do with the price of crude.

The invitation list included men from Sohio, Stanolind, Service Pipe Line, Humble, Sinclair, Arkansas Fuel Oil, and Pure. However, only a few actually attended because Humble's price action on January 3 made most of the crude men quite busy.

Asked when he learned of the Humble price raise, Howell said he was told about it by a stock broker. He explained then he called officials at Esso Standard to check, explaining: "I had to check somewhere, naturally, since it came from a stock broker I wasn't sure."

At one point when the questioning threatened to wander afar, Judge Savage, an avid fisherman and hunter in his spare time observed: "Let's hear more tbout that duck hunting."

In closing Howell's appearance, Monsanto Attorney Jeff Davis had him identify written invitations to the shoot, replies of guests who couldn't attend, and the guest register at the Stuttgart lodge.

Davis' last question: "Did you kill a lot of ducks?"

And Howell's reply: "We had a nice shoot."

Howell's account of the duck shoot made a big hit with spectators and defense lawyers who also were quite happy with the discomfort of government attorneys at the turn of events.

Stipulated testimony of other executives, including Hines Baker, former

Humble president, and H. J. Voorhies, vice president of Esso Standard, was read into the record by the Government. The testimony covered details leading to the price increase and denied any collusion to fix prices.

The documents . . . The Government spent much time late the first week and the first of last week completing its documentary evidence.

The heavy volume of data involved each of the 29 defendants. They consisted of company price bulletins, press releases, economic studies, statements of officials, testimony and nominations before state oil regulatory commissions. The Government's intention was to show that the oil companies by their own statements proved that a price increase was not necessary nor justifiable.

In nearly every instance, defense attorneys followed one or both of two routes in replying to the Government. They would call the judge's attention to other sections of the document tending to refute the government allegation or they would introduce into evidence documents of their own in rebuttal.

The defense . . . Attorneys for the oil companies have been optimistic about their case since the Government started spinning its web of conspiracy early this month.

However, if the defense fails to win its motions for acquittal now, the attorneys feel they can mount a strong defense with documents and witnesses of their own.

Such a move would prolong the trial considerably—and thus far the speed with which the complex case has been handled has been one of its extraordinary features.

North Dakota Sales Set

NORTH DAKOTA will hold the biggest lease sale in its history February 24 when nearly 400,000 mineral acres go on the block.

Oil men in the state report avid interest in the public auctions for oil and gas drilling rights. A large chunk of the acreage is in the vicinity of Shell Oil Co.'s Rough Rider discovery in McKenzie County.

The Bank of North Dakota will conduct its bidding February 23 on 14,540 mineral acres in 14 counties.

The State Land Department will open its bidding the following day on 386,832 mineral acres in 23 counties. The land department sale is expected to last 3 days.

Biggest sale previously was for 106,-159 acres sold by the land department last September.

watching WASHINGTON

Clyde La Motte

• Natural gas faces growing oil opposition . . .

THE ARGUMENTS being made before a FPC examiner in a recent hearing were not surprising, because they had been made many times before. The surprise lay in the fact that those protesting the "invasion" of natural gas were not coal people, but oil-company representatives.

At stake were three projects involving the proposed supply of natural gas into southern California.

Spokesmen for several California oil groups, including Standard Oil Co. of California, Richfield Oil Corp., the Oil Producers Agency of California, and others, said the gas project not only wasn't necessary but that it could have a damaging impact.

They pointed out that the 470 million cubic feet daily of gas planned for the Los Angeles area was the equivalent of 80,000 bbl. daily of fuel oil.

They said this would be quite a blow, tending to dry up fuel-oil sources even though fuel oil was already established in that market and was supplying the fuel needs adequately.

They warned that a one-fuel economy—natural gas—would not be in the best interests of the people. And they argued that the sale of gas to industrial users would be partially subsidized by domestic gas consumers.

It didn't appear that their arguments would have much weight with the FPC examiner, Emory J. Woodall, because he had made the observation at the outset that there didn't seem to be much question about the need for natural gas in California. He implied that if there was any question, it would be about the available supply for the projects.

This attitude by the examiner, coming before the arguments were presented, riled the oil spokesmen so much they suggested that Woodall disqualify himself because of his obvious "bias."

Woodall refused to step down, but said they could appeal to the commission if they wanted to. And, before the week was out, they did just that. They asked the commission to rule Woodall out. The commission late last week had taken no action.

Anyhow, the oil vs. gas aspects of the case interested observers, who wondered if the day was coming when oil would be putting up more of a fight than coal against the natural-gas "invasions."

Woodall made a comment on this, too. He said he wasn't sure who was talking for the oil companies, that one representative seemed to be selling gas and another, from the same company, seemed to be selling oil. He obviously said this lightly, but it did demonstrate the predicament companies are facing increasingly when they supply both oil and gas to the same market.

• Liquefied methane may compete with both . . .

IF YOU THINK that the growing use of natural gas has complicated the energy picture, consider what may happen when liquefied methane from abroad makes a move to grab domestic markets away from either or both.

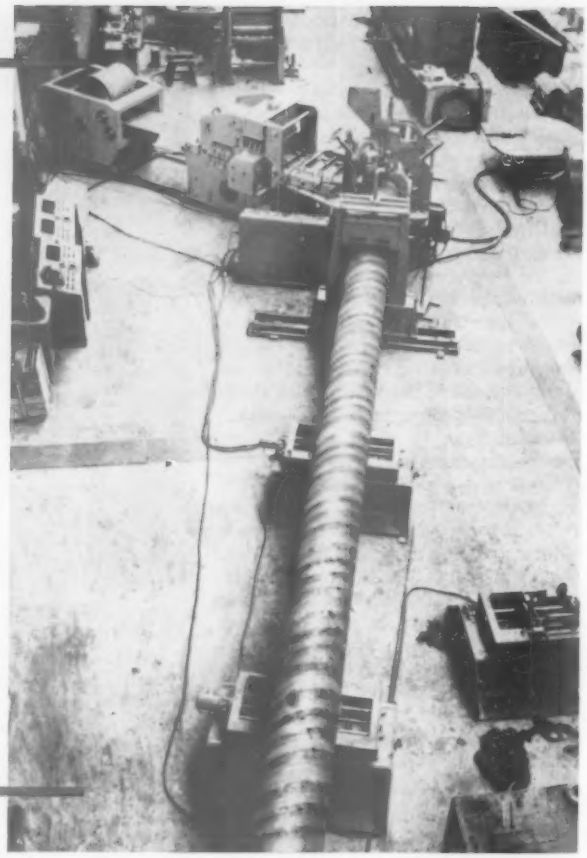
This could be liquefied natural gas from Venezuela, or the Middle East, or Africa, and it might eventually create as much of a furor as the imports of cheap residual fuel.

FPC Commissioner William R. Connole went into this possibility in a speech recently.

The way he sees it, liquefied natural gas is very likely to loom large on the fuels horizon within 10 years, maybe even 5. He thinks now is the time to consider the possible problem, and not wait until its on the doorstep. He figures a national policy now would ward off headaches later.

Here's a continuous pipe-making machine which:

- Produces spiral, double-welded pipe on the right-of-way.
- Will make pipe in several sizes, ranging from ½-in. to 120-in. in diameter.
- Can be mounted on a trailer.
- Is being used on several lines being laid in Europe and Africa.



New Machine Can Make Line Pipe on

THE PIPE DREAM of pipeliners—making and laying pipe as you move along the right-of-way—may be pretty close to realization.

Line pipe for pipelines can be, and is being manufactured right along the right-of-way, according to word from Europe.

The device that does it is a trailer-mounted mill capable of converting ribbons of metal into spiral, double-welded pipe.

A score of mills capable of performing this feat are in operation in Europe and Africa. Very few are trailer-mounted as yet, but all but one of them could be. None has yet been used in the United States. But more than one U. S. company is actively interested, and the first such mill to come to this country is expected to be en route soon.

Mobility is just one of the advantages claimed for this versatile mill. Here are some others:

. . . **Continuous processing** makes it possible to produce pipe of any length.

. . . **Inventories** of raw material can be cut down.

. . . **Scrap loss** is very small.

. . . **Different sizes** can be made by easy alterations.

. . . **On-the-site** manufacturing by mobile machines results in substantial savings.

. . . **Perfectly straight** and round pipe is produced.

. . . **Fewer operators** are required than in a conventional mill.

The mill . . . Mills are available in a variety of sizes.

A brochure lists seven. These will make pipe in these diameters: ½ to 3 in.; 3 to 6 in.; 6 to 10 in.; 10 to 16 in.; 16 to 28 in.; 28 to 40 in.; and 40 to 80 in. Another, not included in the brochure, is said to be capable of producing pipe from 80 to 120 in. in diameter.

Wall thicknesses can range from 22 gage to ⅛-in. on the smallest mill to a range of from ¼-in. to ⅝-in. on the largest. Width of strips can range from 2 to 5 in. for the smallest and from 48 to 96 in. for the largest mills.

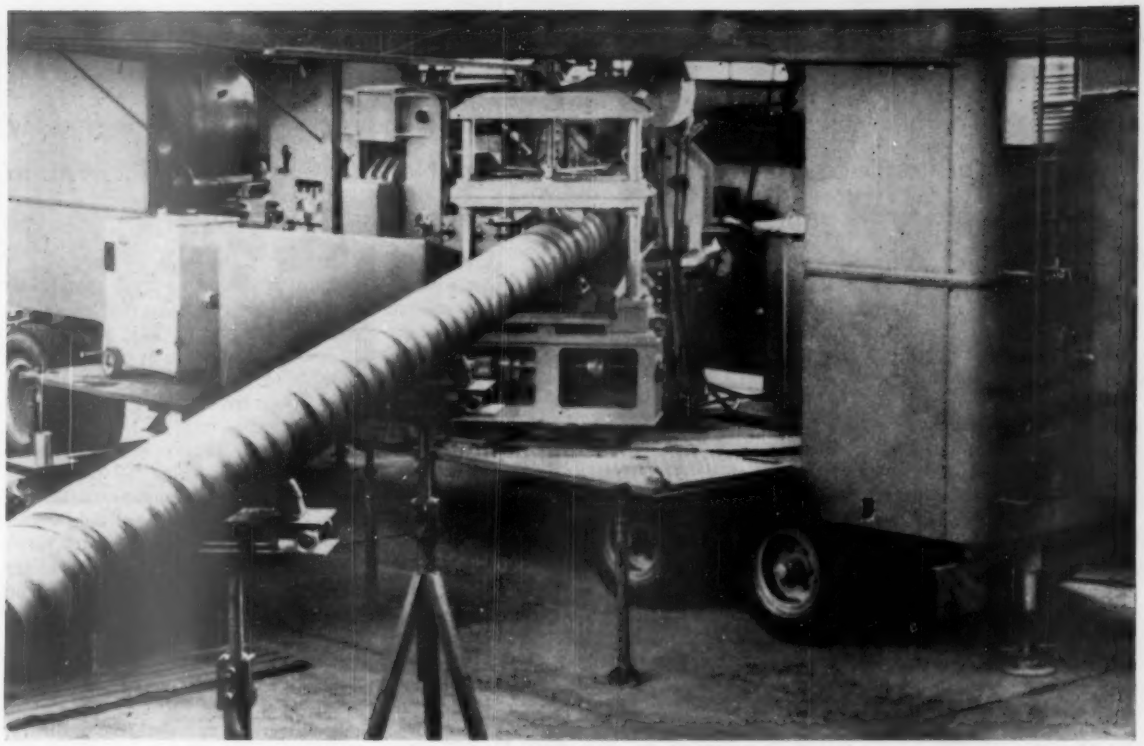
Development of the mill is credited to Dr. Vilem Eckhardt, a Czech refugee now living in Western Germany. His firm is Driam, S. A., and is represented in the U. S. by the Driam Division of David Douglas & Co., Inc., Manitowoc, Wis. Similar mills are being offered or planned by other firms.

Mills in use . . . Driam sold its first mills in 1957, one each to French and German firms. Both buyers bought additional units in 1958. The first units sold to firms in Great Britain and the United Arab Republic also were sold in 1958.

The British buyer, British Steel Piling Co., is using the mill to make piling. The Arab buyer, General Organization for Petroleum Affairs, Pipe Line Administration, Cairo, is using it for making oil lines.

Last year a dozen machines were sold to new customers in Europe and Africa and to a number of repeat customers.

Several gas-distribution systems in France are reported to have been laid with Driam pipe. Two machines are reported to be producing pipe for a



SOME MODELS of the continuous pipe-making mill have been trailer mounted. In this photo, the spool of metal used to make the spiral-type pipe is in the upper left corner. The finished pipe is shown coming out the side of the trailer.

Right-of-Way

20-mile, 16-in. natural-gas line between Bone and Algiers in Algeria.

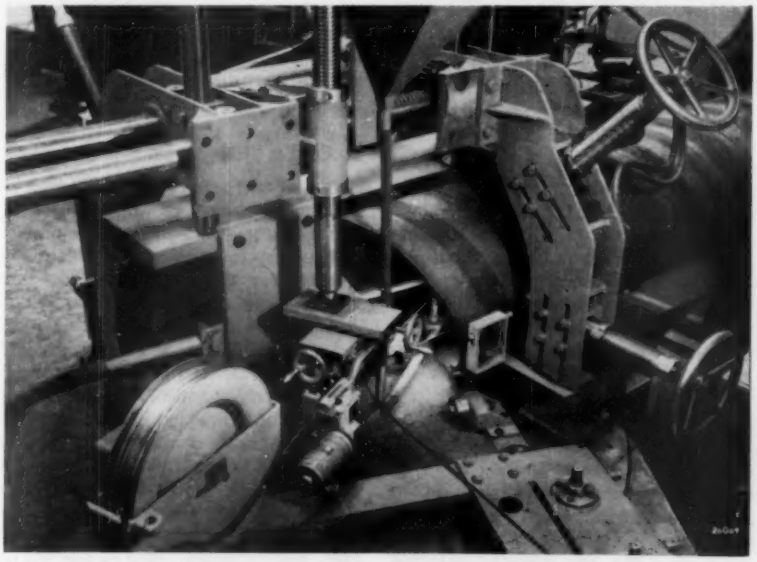
Advantages . . . These mills are said to be highly sparing of manpower in their operation. Only two men are required to operate mills—producing pipe up to 16 in. in diameter. Three are needed on the larger mills.

Here are some stated rates of production:

Diameter (in.)	Wall	Tons per 8 hr.	Length per 8 hr.
32	.313	36	880 ft.
18	.250	24	1,350 ft.
8⅝	.188	14½	2,042 ft.

Driam says its mills will "fabricate the pipe . . . at roughly one-half the cost of conventional mills."

Driam also claims a higher quality product, both structurally and pressurewise. And, it says, the mills are also able to fabricate pipe sizes which have hitherto been impossible in conventional mills, for example 40-in. pipe with ⅛-in. wall thickness.



PIPE produced by the continuous pipe-making machine is double welded. In the foreground is the interior welding machine unit and in the background is the exterior welding unit. Promoters of the machine claim the double weld gives the pipe more strength than pipe made by conventional methods.

In aluminum, Driam says it has formed 14-in. pipe with ¼-in. wall, which also has been impossible in a conventional pipe mill.

One pipeliner sees possible advantages in the manufacture of pipe for gathering lines. Another sees trouble in getting highway and railroad authorities to approve use of such pipe in crossings. Still another sees "real freight savings" in shipping rolls of metal to the mobile mill on the right-of-way instead of shipping large quantities of finished pipe.

Friend or Foe? Coal Doesn't Know

• The "new look" taking shape in the coal industry could either be friendly or hostile to oil. There are indications the National Coal Association wants to cooperate with oil, but no clear-cut decision has been made.

WHETHER there will be more fighting or more cooperation in the future between the coal industry and the oil industry appears to be a decision that is hanging in the balance.

The newly-reorganized National Coal Association considers itself to be at a crossroads now, ready and able to move in one direction or another as conditions seem to dictate.

It can choose to follow the route leading to aggressive drives for legislative or administrative action to protect or to strengthen its competitive position in a fuels race.

Or it can choose to follow a course of better understanding and more cooperation between the industries in a "live and let live" atmosphere.

The association's leaders say they much prefer the second course. But they make it abundantly clear that they will fight, if need be, for competitive survival.

They insist that they are not seeking to threaten or to challenge the oil industry, but to state the simple fact of life that they intend to stay alive.

1. Coal's approach

There are indications that the coal industry is seeking to avoid a showdown fight.

For example, the National Coal Policy Conference (a broader coal and coal-related organization) appears to be withdrawing from its earlier advocacy of end-use controls in legislation now being considered by Congress.

A public statement on this change in view may be made soon.

There are indications, too, that the coal industry may be willing to swing some support behind legislation aimed at easing controls of natural-gas producers—if it gets some sort of assurances that the gas industry will not concentrate on a campaign to knock coal out of what coal considers as its natural markets.

In other words, there are areas in which the coal industry feels that there is much more to be gained from working with the oil and gas industry than could be gained by either side in a dog-eat-dog fight.

It claims that in the long run the public would also benefit.

There are other straws in the wind to indicate that the coal industry isn't committed to a course of action calling for legislative or adminstrative action to help solve its problems.

This shows up more in the atmosphere surrounding coal activities than it does in outright policy statements or positive actions.

For one thing, those who know Stephen F. Dunn, the National Coal Association's new president, are well aware that he does not favor the general trend of more and more governmental controls for industry.

And, in shaping up its new budget, the association has put the most emphasis on marketing and research.

Through this approach, it hopes to make coal a more vigorous competitor in the normal setting of competitive free enterprise rather than through governmental regulation.

This, it feels, is an answer to some oil-industry critics who have charged that coal sat on its backsides for years while its markets were disappearing and then rushed to Washington for relief.

2. Coal's "New Look"

But whether coal is still at a policy-making crossroads or not, there is no doubt that it is in an aggressive mood.

The very formation of the National Coal Policy Conference and the reorganization of the National Coal Association are evidence of this.

So is the fact that the association hired Dunn as its first paid president (at a pretty handsome figure, the Washington grapevine indicates).

Dunn is not a coal man. Rather, he is an expert in the field of association work and governmental relations.

Also, the coal industry is going to continue pressing for a congressional fuels policy study. And while it is drawing back from advocacy of end-use controls, you may be sure that the industry would not be unhappy if a congressional study should eventually result in recommendations for some such controls.

It will also keep the pressure on for the establishment of coal research projects by the Department of Interior, with a $2-million budget for the first year's operation.

Thus, it should be clear that if the coal industry is going to help promote a "live and let live" policy with oil and other industries, coal certainly expects to have some voice in the terms to be lived by.

It obviously has made progress in the past year in rallying the various segments of the coal and related industries behind a common cause.

Its organization is more tightly knit now. Some of the intraindustry rivalries and jealousies have been eliminated or swept under the rug. Some overlapping and duplication of efforts has been ironed out, and a clearer understanding appears to exist about who is to do what, and how.

All of this tends to add up to more muscle power for the coal industry. You can bet that it intends to use that power to the best of its ability to improve coal's plight.

3. Organization

There are two key factors in this "new look" of the coal industry.

One is the National Coal Association, with its new alignment and its broadened scope.

The other is the National Coal Policy Conference, the broader unit which includes not only coal producers but such coal-related industries as the manufacturers of coal equipment, coal-carrying railroads, and others. And it includes the coal union.

There is no reason to believe there is any conflict or cross purposes involved here.

The National Coal Association, which has as its members coal producers and the sales groups working for those producers, will continue to concentrate in this field.

The conference, with its wider scope, will seek to unite the efforts of the varied interests into a push for general coal improvement.

One indication of the likelihood that there will be cooperation between the two is the fact that some men who are members of the board of directors of one organization are also board members of the other.

It appears, therefore, that the formation of the National Coal Policy Conference and the reorganization of the National Coal Association are re-

Stephen F. Dunn
. . recruited to head the "new look."

Robert E. Lee Hall
. . he heads NCA's legal machinery.

Tom Pickett
. . former congressman on payroll.

Who's Who at the National Coal Association

HERE are the key men who will help give the reorganized National Coal Association a "new look":

Stephen F. Dunn, the new president and the first president to draw a salary. He is a former general counsel of the Department of Commerce, and he was vice president in charge of government relations at the National Associatio.. of Manufacturers at the time he was hired by the coal group. He was hired because of his ability to organize, to direct, and to "activate." He is experienced in association work, governmental and public relations.

Robert E. Lee Hall, general counsel of the association for 12 years. His former background was not in coal but in legal and industrial-relations work. He was an industry member of the War Labor Board and of the National Wage Stabilization Board.

Tom Pickett, vice president of government relations for the NCA. He was the association's executive vice president from 1952 until the current reorganization. Before joining the association, he was a congressman from Texas. He, like Dunn, is more experienced in the ways of Washington than of the coal industry.

W. W. Bayfield, vice president in charge NCA's new marketing department, was formerly executive vice president of American Coal Sales Association.

Thomas Howarth, secretary and assistant treasurer, will also be director of fiscal management.

F. F. Estes will continue as director of transportation and Rex Chaney will continue as director of public relations. Myles E. Robinson will continue as director of economics and statistics.

lated rather than competing developments.

The start of the "new look" at the NCA came last June when the board decided to reorganize the association and to merge it with other organizations having related activities.

This occurred after an independent management-survey organization made a study and recommended such action.

It was also decided at this time to hire a paid president, rather than having that as a somewhat honorary position to be filled by industry members.

In October, the announcement was made that Dunn had been hired to head the NCA.

In January of this year, the reorganization became a formal accomplishment.

Under the reorganization, the American Coal Sales Association, heretofore a separate and distinct organization, and the Bituminous Coal Institute, which performs a marketing service for coal users, were combined into a new marketing department of the NCA.

Closer working relationship was also established between the NCA and other industry organizations, such as the Coal Exporters Association, which seeks markets for American coal overseas, and the Fuels Research Council, which represents coal interests before the Federal Power Commission.

The NCA now has six major departments: Fiscal management, government relations, marketing, public relations, research, and transportation.

Actually, the new areas are the broadened marketing activities created by the merging of these units, broadened government relations, and a step-up in research.

The new research division has not yet been staffed, but plans are to do this soon.

Some acivities formerly done in the field will now be done in Washington.

The Washington staff is made up of around 35 people, not including clerical help. The NCA is currently quartered in the Southern Building in downtown Washington, but a new building is under construction.

The budget is apparently being beefed up, but the exact amount is still to be determined by the board.

NCA officials maintain that the "new look" does not stem from a greatly increased staff or budget, however, but from a streamlining of the organization, a unification of effort, and a clarification of duties and objectives.

With the reorganization now pretty well completed, the association is ready to start moving away from the crossroads. Its path may not yet be entirely clear, but it is clear that the NCA intends to be on the move.

What's Ahead for Oil-Company Mergers

• Continental official sees continued rapid pace for property transfers for next few years, based on study of transactions over 6-year period.

THE TREND toward acquisitions and mergers in the oil industry will continue for the next 2 or 3 years—barring an adverse legal climate or an economic recession.

Such transactions during that period are likely to equal or exceed the high rate established during the first 9 months of 1959 when 109 changes were reported.

That's the prediction of H. Marshall Farrier, Oklahoma City, assistant to the central regional manager for Continental Oil Co., following a study of oil-industry property transfers during the last 6 years.

Farrier cites the principal economic conditions which have spurred the large number of acquisitions and mergers during that period, and he points out the same economic pressures are expected to be present for the next few years to keep the merger trend continuing.

After 2 or 3 years, he says, a pause in the economy's growth might slow the rate of the property changes.

The trend . . . Farrier's study covered the period from January 1, 1954, to October 1, 1959.

It shows 519 complete or partial company acquisitions made by 238 acquiring companies or individuals reported during that time. These were solely U. S. or Canadian properties.

All of the buyers and sellers were engaged in producing, refining, and/or marketing of crude oil or natural gas liquids either before or as a result of the acquisitions.

A breakdown of the 519 acquisitions shows that:

Mergers, Acquisitions

(January 1, 1954, to October 1, 1959)

Year	Number
1959 (9 months)	109
1958	83
1957	83
1956	105
1955	62
1954	77
Total	519

. . . **The acquisition** of oil and gas production represented the largest single group in the property transfers.

. . . **A great deal** of emphasis has been placed recently on acquisition of marking and/or refining properties, particularly by the integrated companies.

. . . **Integrated companies** placed considerably less emphasis upon the purchase of producing properties.

Reasons for trend . . . Farrier points out the principal motivating factor behind the purchases is opportunity for profit, strengthening a company's competitive position by improving operating efficiency.

He says generally, the larger companies felt the need to acquire both domestic and foreign crude-oil reserves and domestic and, in several cases, foreign marketing outlets for products.

Crude-oil reserves remain essential, and companies with substantial refining and marketing facilities are under considerable pressure to acquire domestic and foreign crude-oil reserves.

The increases in costs of finding and developing their own crude-oil and natural-gas reserves has caused some companies to acquire them.

The increasing domestic exploration and development costs also have caused many companies to go abroad, and this has resulted in substantial excess crude-oil producing capacities—which increases the need for foreign marketing outlets.

Farrier also says the increasingly larger share of the U. S. gasoline market being taken by the so-called low-price marketers has caused domestic marketing companies to purchase additional outlets and enter this phase of gasoline retailing.

He cites as other reasons the establishment of fully integrated operations, the desire to diversify family investments, federal income taxes, and estate problems.

Farrier says these economic pressures will continue, but they may be offset by an adverse legal climate.

He cites the proposed merger of Superior Oil Co. of California and Texaco Inc. being blocked by the threat of a government antitrust suit (OGJ, Sept. 28, p. 51). However, he adds, this proposed merger involved companies much larger than those participating in the acquisitions which occurred during the 6-year period.

But since the study was made, plans by Standard Oil Co. (Ohio) to acquire Leonard Refineries, Inc., a Michigan refining and marketing company, were abandoned when the Government moved to stop the merger by court action (OGJ, Jan. 25, p. 129).

Seaton Repeats: Gas Bill Needs United Front

THE DRIVE for natural-gas legislation still appears to be on dead center, despite increasing efforts by producer groups to get it rolling this year.

The latest effort to provide some push was made by the liaison committee of 15 cooperating oil and gas associations. After a recent meeting in Washington, the committee said its members concurred in the need for congressional action in 1960.

But Interior Sec. Fred Seaton indicated last week that the administration isn't going to lead the way.

He said that what he told the American Gas Association in a speech last fall still represents his views. That speech called for initial action by the gas industry, with proposals which would be approved by all segments and which would include "adequate" protection for gas consumers.

Until the industry presents such a bill, the administration apparently plans no action.

Seaton did agree, however, that the pile-up of producer cases at the Federal Power Commission would, over the long run, discourage gas exploration and development and that this could have an undesirable effect on vast consuming segments of the nation.

The producers' liaison committee, which said it would cooperate with the Independent Petroleum Association of America in drafting proposed legislation, said that some of the industry's complacency may stem from the fact that "certain" segments of the industry find no objection to the present utility status of independent producers.

The committee said it had heard a report that some members of congress and others had been told by so-called gas industry spokesmen that there is no urgent need for decontrol legislation. The committee said such statements should not go unchallenged.

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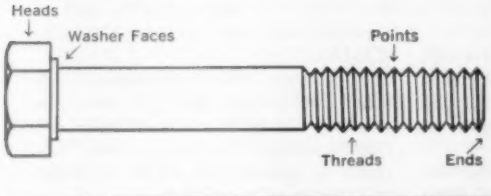

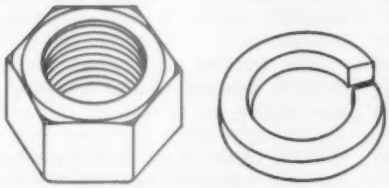

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Where Zapata Offshore Is Busy

Why Zapata Is Working in Foreign Waters

• Although the company's four offshore rigs are now drilling abroad, the president points out it isn't by choice. He's still convinced the Gulf of Mexico is the last big frontier of proven reserves in U. S.

IT'S ONLY by coincidence that Zapata Off-Shore Co. today finds itself a full-time foreign operator.

George H. W. Bush, the restless 35-year-old president of Zapata, is a great believer in the future of domestic offshore development and intends to play more than just supporting role in it during the years ahead.

For the moment, however, Zapata's four offshore rigs are abroad—two in the Gulf of Paria between Venezuela and Trinidad, and two in the Gulf of Campeche off Mexico's Coatzacoalcos.

How did it happen?

"It's pure coincidence," Bush says. "The main reason is that we got 1-year contracts. We don't like to sweat it out from well to well."

That's the story. Zapata has found that, despite the fact all available offshore rigs in Louisiana and Texas are busy, contractors still work on a well-to-well basis.

In contrast, producers abroad are willing to grant long-term contracts to acquire equipment for their operations.

"Our moving abroad reflects no lack of confidence in the Gulf of Mexico," Bush said. "It's the last big frontier of proven reserves in the U. S."

But, for now, Zapata is hard at work in Latin American waters.

The rigs . . . Zapata has sent five rigs to Campeche and Paria within the past year, and four of them are busy. The fifth suffered a hurricane blow at Campeche and is beached.

The Nola I, the first over-the-side floating drilling vessel, went to Paria last fall to drill for the five-company Paria Operations, Inc., in the Venezuelan sector of the gulf.

Before the converted YF tender went into foreign service, it operated off Louisiana for the CATC group, The California Co., and for Zapata itself on a farmout. Currently it operates at Paria in 100 ft. of water and drills to around 10,000 ft.

The Nola III, a sister ship of the Nola I, went to the Trinidad side of the Gulf of Paria at year's end and is doing development work in about 30 ft. of water. It is working for Kern-Trinidad Oilfields, Ltd., a subsidiary of Kern Oil Co., Ltd., London.

Zapata's two huge self-contained mobile drilling platforms, the Vinegarroon and the Scorpion, are in the Gulf of Campeche drilling for Pauley Pan American Co., a firm operating in Mexico under the name of Mexican-American Independent Co. (CIMA).

Both rigs have approximately a year's work set out for them in Pauley's newly discovered field off Coatzacoalcos. The Vinegarroon currently is operating in 88 ft. of water and the Scorpion in 55 ft.

The Nola II . . . Zapata has found that life abroad is not all peaches and cream.

Last October the newly converted Nola II, another sister to the Nola I, was rigging up to drill its first well for Pauley when a hurricane struck. Because of the nearness of the shore, the ship was swept onto the beach—and it's still there.

The million-dollar vessel probably will never float again, though some of its equipment can be salvaged.

It was after the Nola II mishap that the Scorpion was pressed into service for the Pauley operation. The Scorpion had been drilling off Louisiana and earlier had drilled what is be-

lieved to be the deepest offshore hole, a dry hole close to 19,000 ft. deep at the Cay Sal Bank in the Bahamas for California Standard and Gulf Oil.

Foreign vs. domestic . . . If Zapata appears to have a split personality about drilling in foreign waters but still preferring Louisiana's, it's really nothing to worry about.

President Bush says "you can find all kinds of ideal places" throughout the world to drill offshore by the floating drilling method.

"Anyplace you have protected waters or normal weather is good," he says. "And open water isn't too bad in some places."

The Gulf of Paria is one of the ideal spots on the globe for floating drilling, but Bush keeps his fingers crossed when operating at Campeche or off Louisiana in bad weather.

"The Gulf of Mexico is much rougher than off California," he adds. Bush was quick to point out, however, that Zapata's mobile barges can weather almost any kind of storm. They survived Hurricane Aubrey and other tropical storms off Louisiana, the Bahamas, and in Campeche.

But oil men looking abroad can find plenty of good hunting grounds—from the coasts of South America, to those of West Africa, the Mediterranean, and the Persian Gulf.

"There are many places they haven't drilled yet but will," he says.

But Bush's first love admittedly is offshore Louisiana.

"I believe that when we get a healthy, vital domestic industry again, the drilling program off Louisiana will be three or four times as big," he says.

The company . . . Zapata Off-Shore was born just last summer when it was split off from Zapata Petroleum Corp., Midland, and set up headquarters in Houston.

Bush, the son of a U. S. senator from Connecticut, had formed the original Zapata in 1953 with J. Hugh Liedtke. Each man today is the head of his separate company, Bush concentrating on offshore work and Liedtke primarily on exploration in West Texas and Canada.

Zapata Off-Shore is primarily a contract drilling company, but Bush is setting his sights on becoming a sizable producer, too. In fact, the company now has three gas producers in Louisiana's Vermilion area—all gained through farmouts from Calco and CATC.

Bush intends to become a bigger frog in the Louisiana puddle. But he is also the first to recognize that mounting costs and the high costs of drilling over water are handicaps for the small operator, whether a drilling contractor or a producer.

"I believe that over the years you will see more companies getting together," he says.

Mass Flowmeter

. . . measures ethylene gas with accuracy of 1%.

USING General Electric's recently-introduced industrial mass flowmeter, it is now possible to measure ethylene flow directly in pounds with an accuracy of within 1%.

The fact that measurements are made directly in pounds means that variations in pressure, temperature, and density of the measured substance have no effect on its accuracy. In contrast, data from conventional orifice meters must be mathematically corrected to compensate for ethylene's deviation from the physical laws of gas behavior. Also, time-consuming calculations to derive orifice coefficients and integrate chart records are eliminated by the mass flowmeter.

Since the flowmeter continuously registers total ethylene flow, it is only necessary to subtract a previous reading from the present one to determine flow during any period of time.

Models will be available shortly capable of transmitting signals directly to strip-chart recorders for continuous records of mass rate of flow. And plans are being made to equip these recorders with electric control nodes, so that control of ethylene flow rate will also be possible.

INDUSTRY BRIEFS . . .

Jade Oil, Houston, has purchased oil and gas producing properties of Admiral Drilling Co., Houston. The properties consist of eight gas wells and five oil wells in the Gulf Coast and North Texas. The deal included 3,000 acres of producing and nonproducing land.

Pan Geo Atlas Corp., Houston well-service company, has purchased the Acoustic Logging Division of Empire Geophysical, Inc., Fort Worth. Acoustic Logging offices are in Corpus Christi, Odessa, Tex., and Jackson, Miss.

Tennessee Gas Transmission Co. plans to purchase Fifteen Oil Co., a Houston independent. The $17 million deal is subject to approval of Fifteen Oil's stockholders and a favorable Internal Revenue Department ruling on tax aspects of the sale. Fifteen Oil, founded in 1938, owns approximately 2,000 bbl. daily of crude production and 9,500 net acres of proven properties on the Texas and Louisiana Gulf coast. Its undeveloped properties include acreage in Alaska and the Dominican Republic. Dixon H. Cain is president of Fifteen Oil.

The Baash-Ross division of Joy Manufacturing Co., Houston, has purchased assets of Web Wilson Oil Tools, Los Angeles. Sale price was undisclosed. Wilson produces elevators, tongs, and hydrahooks while Baash-Ross makes drilling and production tools.

Marine Transport Lines, Inc., on March 31 will launch a new 16,625-ton liquid chemical tanker for use of Dow Chemical Corp. The S.S. Leland I. Doan is being built at the Quincy, Mass., yard of Bethlehem Steel Corp.'s ship-building division. It will be 531 ft. long, have a 68-ft. beam, and move at 15 knots.

Texaco Exploration Co. has contracted to explore and develop Crown helium resources on 19,360 acres in the Mankota district, southwestern Saskatchewan, 25 miles north of the international border. Two other agreements for helium search and development in Saskatchewan previously were signed by British American and Sun.

The Louisiana supreme court has ruled a city can not limit the size and location of signs displaying prices of gasoline and petroleum products. It affirmed a district court ruling enjoining the city of New Orleans from enforcing an ordinance, limiting the size of gasoline signs to 12 sq. in. The ordinance was adopted in January 1959.

Action on the offer of Canadian Husky Oil to acquire all common stock of Husky Oil Co., Cody, has been delayed until after March 1. An offer to exchange nine common shares of Canadian Husky for each 10 Husky Oil common shares originally was made, based on evaluations as of June 30, 1959. Decision to update evaluations through December 31, 1959, caused the delay.

Trend of Oil Stocks in 10 Big Mutual and Investment Funds

	Per cent of Common Stocks Held				Oil's
	Dec. 31, 1958	June 30, 1959	Sept. 30, 1959	Dec. 31, 1959	Position
Massachusetts Investors Trust	20.8	17.7	17.0	17.0	1
Wellington Fund	18.4	14.1	13.9	11.5	2
Incorporated Investors	14.9	9.2	8.6	7.7	*4
Lehman Corp.†	25.2	20.2	18.3	16.7	1
Fidelity Fund, Inc.	19.3	14.8	13.4	12.8	1
Tricontinental Corp.	15.5	11.2	10.6	10.0	4
United Funds, Inc. (United Accumulative Fund)	13.8	11.2	10.9	10.2	1
One William Street Fund, Inc.†	12.9	9.0	7.9	7.3	5
Eaton & Howard Stock Fund	16.5	13.3	12.3	10.9	1
Chemical Fund, Inc.†	12.0	10.0	10.0	9.5	3

*Tied with rails. †Includes gas stocks.

Oil Stocks Rate High, Even After Slip

• Most of the mutual funds continued to reduce their oil holdings in the last quarter, but the rate of decline was substantially slowed. And even after a 2-year drop, oil is still tops with half of the big funds.

OIL ISN'T out of the doghouse yet as far as the big mutual and investment funds are concerned.

They continued to trim their oil holdings during the last quarter. But oil companies can take heart from the fact the trimming was quite mild in comparison with other cuts. It could be that oil's popularity with investors has hit bottom and may soon turn upward.

Encouraging was the fact that the biggest fund, Massachusetts Investors Trust, made no reduction in its holdings on oil common stocks during the fourth quarter. It had reduced them sharply during the first half of 1959.

Some of the decline in the percentage of oil stocks held has resulted from lower prices of oil shares. And some is due to improvements in stocks of other industries and their addition to portfolios.

In spite of the sharp drop in 1958 and 1959, oil still ranks first with 5 of the 10 larger funds.

While oil's popularity generally has slipped, a recent analysis by Capital Gains Research Bureau shows substantial oil holdings by 71 of the largest mutual funds. Here are 10 oil companies and the number of funds holding shares of each:

Texaco, 49 funds; Jersey Standard, 41; Gulf, 34; Royal Dutch Petroleum, 37; Standard of California, 36; Continental, 28; Amerada, 21; Shell Oil Co., 21; Superior, 18; and Standard of Indiana, 18.

The $1.5 billion Massachusetts Investors Trust portfolio, for example, presented this picture on December 1:

	Market Value	Pct.
Petroleum	$263,715,491	17
Utilities	$171,040,131	11
Steel	$164,325,000	10.6
Tire and Rubber	$92,539,230	6
Railroads	$91,255,625	5.9
Metals and Mining	$90,208,650	5.8
Chemicals	$89,297,192	5.7

Holdings in these seven industries represented 62% of all stocks held. Oil holdings included shares of 17 companies.

Fund managements are constantly reappraising the status of common stocks. Market analysts generally still favor oils as a sound addition to mutual funds. The funds are not deserting oil as a sinking ship. Rather, they appear to be balancing investments within the 10 to 20 industry groups to maintain a safe conservatism for the long pull.

Standing of oil in the fund portfolios is important. Six of every 10 investors have a stake in mutual investment funds. And these millions of investors watch the shifts in mutual holdings as key indices of business.

As a stock group, oils have been under heavy pressure. But most analysts see oil as successfully bucking some adverse tides. And they think the industry will find any economic shoals surmountable.

Oil Hunt Moves Farther North in Alberta

EXPLORATION has moved farther north in one of the last Alberta frontiers to be tackled in the search for oil and gas—the Caribou Mountain area in the northern part of the province.

An oil team, headed by Crusade Petroleum Corp. Ltd., after constructing a 63-mile road through rugged wilderness, has spudded in the most northern well in the area.

The well is Crusader Dynamic Caribou, 7-8-113-5w5. It is being drilled on a 1,000,000-acre tract owned by a group of Canadian independents sharing in the project.

The operation is shared by Crusade, 35%; Dynamic Petroleum Products, Ltd., 35%; Marpoint Gas & Oil Corp., Ltd., 15%; Larutan Petroleum Corp., Ltd., 10%; and Dynalta Oil & Gas Co., Ltd., 5%.

The test well is located on one of the largest structures ever discovered in Alberta. The length of this structure has been traced for some 34 miles and its width for some 15 miles at its widest point.

The well is approximately 575 air miles north of Calgary. It is being drilled with an Arnim Drilling Co. rig capable of slim-hole drilling to 8,000 to 10,000 ft.

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PHOTOS IN THE **NEWS**

Hot Dog!

TWO 30,000-gal. railroad tank cars—to be the largest ever constructed—are being built by Union Tank Car Co. for use by Tuloma Gas Products Co., Tulsa, marketer of liquefied petroleum products.

The drawing shows the new Hot Dog-30 car, which will have a shell capacity almost three times that of the average size car, shown in background.

The new car, 85 ft. long and with an outside tank diameter of 99 in., costs only twice as much as three 10,000-gal. cars, and operating costs well be much lower—about one-third—than for three 10,000-gal. cars.

The first two Hot Dog-30 cars will be put into service this spring for LPG shipments.

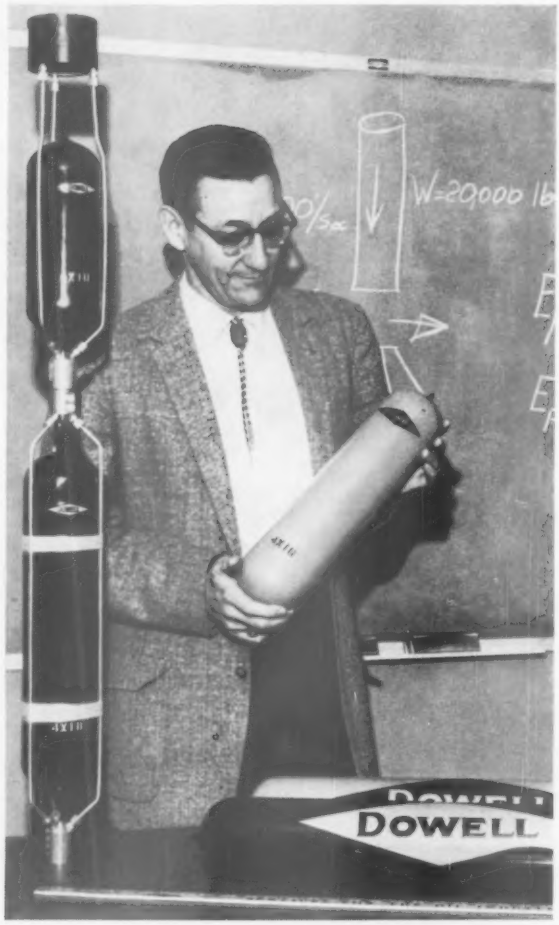
Glass Capsules for Sick Wells

POWERFUL shock waves of an "implosion"—air rushing into a vacuum—have been harnessed by Dowell Division of Dow Chemical Co. for service work in oil and gas wells.

The implosion force is obtained by bursting a specially designed glass capsule lowered into the well on a wire line or tubing. The capsules are imploded by pressurizing the fluid in the well.

Dowell says the technique has been used in 50 wells for various purposes, such as shattering rock or disintegrating mud cake or scale accumulations that seal off the well bore.

The capsules, 4 in. in diameter and from 8 in. to 4 ft. long, can also be used in tandem, as shown at the left of D. D. Setser, Dowell development engineer.



Fire Baptism

PLASTIC pipe, being developed by Esso Research & Engineering Co. in Linden, N. J., undergoes tests to demonstrate its fire resistance. The pipe survived a 15-minute gasoline fire.

Esso says the glass-reinforced plastic pipe can withstand temperatures ranging from −40° to 300° F. and is easy to handle due to its light weight.

Toppled Rig

THE DERRICK of Drilling & Exploration Co. toppled full length on its side and scattered 11,000 ft. of drill pipe like matchsticks around the derrick floor. Well location is 12 miles south of Hattiesburg, Miss. A crewman working 85 ft. above the floor on the monkey board was killed in the crash.

Texas Size

HUMBLE has opened its biggest service station—in Texas, of course—with appropriate ceremony.

The station, located in Dallas' Brook Hollow industrial center, cost approximately $70,000. It is believed to be the first to incorporate the unusual hyperbolic paraboloid roof.

California Drilling Outlook: New Problem

CALIFORNIA drilling contractors are convinced it's going to be a great year for either the drill-pipe makers or the fishing-tool manufacturers.

That is one way of saying worn-out drill pipe is becoming general and must be replaced or operators are going to be spending a lot of time fishing for it down the hole.

It points up a new problem threatening the West Coast drilling industry—already plagued by a scarcity of jobs which has pushed contract rig activity down to the lowest level in 10 years.

The new trouble is the aftermath of recent lean years which have resulted in the growing number of idle rigs and competition so stiff that some jobs are taken at less than cost.

Contractors have not been replacing their drill pipe. Supply houses report 1958 and 1959 were record low years for drill-pipe sales. The contractors admit a serious problem is looming, but they throw up their hands when trying to figure out where the money is going to come from to replace the pipe.

Rigs are getting in the same shape. Only one complete new rig was purchased last year by a California contractor—and he promptly shipped it to Alaska.

The contractors have been living off their idle rigs, with only occasional unit replacements. One points out a day of reckoning is coming because equipment rapidly is becoming obsolete.

Some contractors say a big drilling boom would catch them short, despite the large number of idle rigs. They point out many of the idle rigs have been cannibalized and are virtually useless.

Current woes . . . Drilling activity is down in practically every oil area in the state.

The picture would even be worse if it weren't for the drilling boom resulting from the program to halt subsidence in Wilmington field in Los Angeles County.

A survey showed that on February 1 there were 210 contract rigs available. Of these, 75 were actively drilling and 21 were either rigging up or moving on or off locations. That compares with 105 contract rigs active on the same date 2 years ago.

While contract drilling has dropped off, the number of active, company-operated rigs has shown only a slight decrease—from 28 rigs 2 years ago to 24 rigs on February 1.

Hardest hit by the drilling lull have been the shallow rigs (up to 5,000 ft.) and the medium rigs (up to 10,000 ft.) Of 47 shallow rigs available, only 13 were working. Thirty-four of 75 medium rigs were active, while 49 out of 88 deep rigs were on jobs.

The situation has sharpened competition. A contractor may get one job out of 30 to 40 bids now, compared with the past when he could expect to get one out of every 10 or 15 bids submitted.

Most of the contractors report that every rig in the state is for sale, although no one is out trying to peddle them.

One gives this gloomy report: He doesn't know of a contractor who wouldn't get out of the business tomorrow—if he could salvage his shirt in the process.

PROCESSING BRIEFS . . .

Sinclair and Koppers will form a new corporation to build and operate a styrene monomer plant at Houston. Sinclair will furnish the raw material from its Houston refinery and Koppers will either use or market the 70 million pounds per year styrene output. Construction of the plant will start immediately. The plant will go on stream in mid-1961.

Goodrich-Gulf Chemicals is planning to have a plant in operation by late 1961 that will produce interchangeably about 25,000 tons of polyisoprene or cis-polybutadiene rubber. Possible plant location will be in Orange County, Texas, or Institute, W. Va.

Dow Chemical plans to expand styrene facilities at both Freeport, Tex., and Midland, Mich., to bring total production capacity to 800 million pounds per year. Completion is planned by late 1960 or early 1961.

Dow Chemical's new 36-million-pound per year phenol plant will be located at Kalama, Wash. Facilities should be complete by mid-1961.

Canada's largest gas processing plant will be built by British Amerian near Rimbey, Alta. The $12.5-million plant will process 326 million cubic feet of natural gas per day and recover 1,950 bbl. of propane, 2,800 bbl. of butane, 9,300 bbl. of condensate, and 233 long tons of sulfur.

Five service stations and four bulk plants in Nebraska have been purchased from Wendell Foote Oil Co., Nebraska marketing firm, by Derby Refining division of Colorado Oil & Gas Corp. The service stations will be operated under the Derby name.

Krell & Associates, Houston, will build an adsorption pilot plant using molecular sieves. The pilot plant will be used to develop more uses for adsorption.

Construction of a Udex unit, to produce 600 bbl. of benzene daily, will begin March 1 at DX Sunray's Tulsa refinery. Completion of the $1-million unit is scheduled by October 1. The unit also will produce 300 bbl. of toluene daily. Refinery Engineering, Tulsa, will handle construction.

Celanese Plastics Co. plans to increase the capacity of its high-density polyethylene plant at Houston to 50,000,000 lbs. per year, a 25% increase. The plant, opened in March, 1957, originally was scheduled to reach a capacity of 40,000,000 lbs. per year in stages.

Also for Refiners . . .

IN THE NEWS: GE's flowmeter gives more accurate ethylene measurement (p. 67) . . . OCAW and Humble come to terms at Baytown refinery (p. 76) . . . Refinery planned near Paris to handle Coulommes crude (p. 79) . . . Lanchow refinery is pride of Red China (p. 81).

PLUS THIS TECHNICAL REPORT: BP's cat crackers get feed free of metal contamination (p. 107).

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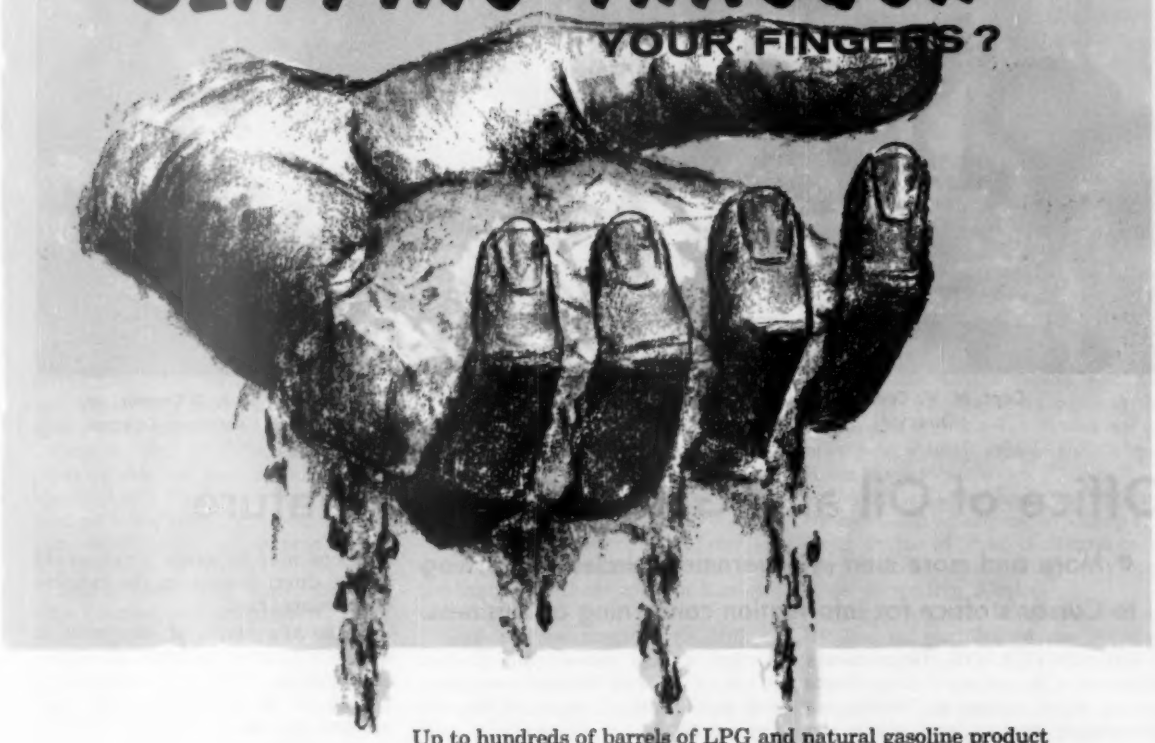

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Office of Oil and Gas Is Gaining Stature

• More and more men in government circles are turning to Carson's office for information concerning oil business.

THE INTERIOR Department's Office of Oil and Gas is gradually gaining more stature in Washington government circles. And with the growing involvement of Government with oil, this could be important to the industry.

There have been times in the past when this operation, then a division, was assigned the routine chores while the big oil projects were handled elsewhere.

Even now, the Office of Oil and Gas is not making many of the major oil decisions, but its voice is being heard with more frequency and with more weight.

There are several reasons for this evolution. One, bluntly, is that other government agencies don't know where else to turn for oil information or advice.

When the Petroleum Administration for Defense existed during the Korean emergency, it filled such a role, but the PAD isn't in existence any longer.

And before the Justice Department began clamping down on the use of industry advisory groups, government agencies often enlisted industry aid in solving problems. But that's more difficult to do now and when it is, a government chairman must preside.

Too, the Office of Civil and Defense Mobilization used to make oil studies, among others. But it does not have the staff for such work now and turns, instead, to the Office of Oil and Gas.

The military, with the Military Petroleum Advisory Board shelved, has turned to the Office of Oil and Gas for assistance.

The State Department, too, is more likely to turn to the Office of Oil and Gas now than in the past. The fact that the director of the office heads the U. S. delegation to NATO oil planning conferences is one evidence of this.

The fact that the director of OOG is also the administrator of the oil import control program helps link those activities, just as the requirement that the director serve as co-chairman of National Petroleum Council meetings helps link OOG with that government-industry operation.

Congressional committees holding hearings on subjects involving oil are turning more and more to the Office of Oil and Gas for the government's view.

What OOG is doing . . . One of the biggest—and most ticklish—tasks the office is struggling with now is a report on the outlook for oil in 1975.

This study, requested by OCDM, very likely will wind up eventually in the cabinet. From it, basic policy decisions may be made which could have a direct impact on the industry in the years ahead.

In such a study, it obviously is necessary to estimate future oil supply and demand, evaluate the long-range impact of oil import controls, and measure the size of a variety of other problems inherent in the nation's energy picture.

The study, if it is made public, will probably stir up a hornet's nest. If so, the OOG will be in the middle.

Another ticklish problem the office is working with currently is to estab-

PIPELINE

A $45-million expansion, with emphasis on looping, is planned by Trunkline Gas Co., which is just completing an $81.5-million program started last year. Trunkline, a subsidiary of Panhandle Eastern Pipe Line, has filed with FPC an application to increase daily delivery capacity by 200,000,000 cu. ft. All of the increased throughput would go to the parent company.

A 43-mile 20-in. line will be built by Atlantic Seaboard from the company's Seneca, W. Va., compressor station to its Terra Alta storage project in Preston County. FPC has granted temporary authority for the $25,202,135

lish the framework for a readiness subcommittee of the Foreign Petroleum Supply Committee.

The military has been increasingly insistent that it must have such a committee to help it get the information and guidance it needs on emergency oil problems. Meanwhile, the Justice Department has been insistent that care must be taken to guard against making individual oil company data available to any industry group.

The possible solution, which includes OOG personnel serving as chairman of committees and subcommittees, is about ready for testing.

Meanwhile, the Office of Oil and Gas has been making some refining and transportation studies, among other, which in the past probably would have been handled by an industry committee.

In a somewhat related function, the office has been drafting plans for use under emergency conditions. This work involves the selection and indoctrination of an executive reserve, drawn from the oil industry. These will be the men who will take charge of oil operations in the event of a nuclear attack or some other national or international emergency.

What all this adds up to is a broadening field of activity by the OOG. There is little reason to believe that this will decrease in the near future. Rather, the role will probably continue to expand.

OOG's top man . . . The man currently in the driver's seat is Navy Capt. Matthew V. Carson. Wearing two hats—as imports administrator and as OOG director—he is becoming well known throughout the oil industry.

And while the role of imports administrator has been the hotter of the two, it may be that the job as OOG director may become the more important one over the long haul.

Acreage in Western Alaska Goes to Shell

THE INTERIOR Department is convinced that development contracts, rather than an increase in leasing acreage limitations, are the best way to spur oil and gas activity in Alaska.

Interior Sec. Fred Seaton made a point of this last week in announcing approval of a 5-year development contract with Shell Oil Co. for exploration and development of approximately 450,000 acres in Alaska.

Seaton noted that since the first such contract was approved in 1953, nine exploratory wells have been drilled. In addition, a well is being drilled now in the Katalla-Yakataga area, and wells must be started in Knik Arm, Napatuk, and Kenai areas in 1961 to fulfill contract terms.

Seaton's advocacy of development contracts in such areas as Alaska rests on this thesis: Development contracts contain terms calling for certain action to be taken by certain dates. Thus, exploration and drilling work must be undertaken. By contrast, such work may be much slower under the terms of normal federal leases.

That opinion is the basic reason why Interior has opposed, and will continue to oppose, legislation increasing the acreage leasing limitations. (Such limitations do not apply to development contracts.)

The contract with Shell covers an area 90 miles southwest of Bethel, and borders the northern coast of Kussokwim bay.

Shell will be required to drill at least three exploratory holes and spend a minimum of $950,000 during the 5 years of the contract. Also, Shell will have to relinquish half of the acreage before January 1, 1964.

BP entering Alaska . . . British Petroleum will get its feet wet in U. S. exploration for the first time this summer when a small survey party looks over 170,000 acres in Alaska.

BP Exploration Co. (Alaska), Inc., has acquired leases on about 50,000 acres in the Umiat region and has options on 120,000 acres more in the Umiat and Gubik areas. It also has an option on a small area in the Cooper River basin to the south.

In addition to the leases and options, BP has taken an interest in a deep test being drilled by Paul G. Benedum in the Nulato basin, adjoining the Yukon River in western Alaska.

Except for the Benedum wildcat, BP has no partners in the Alaskan operation. The big British company, which is the largest crude producer in the Middle East, formed a joint exploration company with Sinclair Oil Corp. less than 2 years ago. But this company was formed primarily for exploration in Latin America, and Sinclair is not involved in the present program.

BP Exploration has offices in New York and Anchorage.

BRIEFS . . .

project, which also includes a 5,500-hp. compressor station at Terra Alta.

Pipe deliveries will start this month for a looping program of Michigan Wisconsin Pipe Line. Pipe will be stockpiled at several points in Illinois and Indiana to get ready for projects now before FPC. Michigan Wisconsin plans 341 miles of 24-in. and 188 miles of 30-in.

Completion is due this week on 100 miles of 10, 12, and 16-in. supply lines of Transwestern Pipe Line in West Texas and southeast New Mexico. This portion of the supply system was contracted to Western Pipe Line.

A high bid of $315,544 was offered by Lone Star Gas for the 95-mile 10-in. line from Petrolia to Fort Worth, Tex., which Lone Star has leased from the Government since World War I. The line was built during the war to transport helium to a processing plant. Another bidder, Texas Crude Oil Co. of Fort Worth, offered $150,000.

A 64-mile gathering system is planned by El Paso Natural Gas to permit delivery of 25,000,000 cu. ft. daily to Northern Natural Gas in Beaver County, Oklahoma. El Paso will purchase gas from eight producers in Beaver and Ellis counties, Oklahoma, and Hemphill, Lipscomb, and Ochiltree counties, Texas.

An underground gas-storage project which would remove a big block to expansion is proposed by Mississippi River Fuel Corp. near St. Jacob, Ill. MRF, in its FPC application, estimates that the storage area, to be developed for $7,800,000, would hold some 32 billion cubic feet of gas.

Also for Pipeliners . . .

IN THE NEWS: Portable mill may make line pipe on the right-of-way (p. 60) . . . Interior Secretary Seaton repeats call for industry action on a gas bill this session (p. 64).

PLUS THIS TECHNICAL REPORT: How Panhandle Eastern combats five common cooling water problems (p. 116).

Oil Co-op Tax Advantages Hit by Jobbers

• Marketing industry, complaining co-ops have become major competitors, are pressing House committee for changes in federal tax policies.

ALTHOUGH no major tax changes are in the immediate offing, there is a growing possibility that federal tax policies applying to cooperatives may be the first to undergo revision.

The House ways and means committee is currently studying the issue of whether tax advantages for cooperatives should be continued or discontinued. Public hearings were held recently, and executive sessions will be held soon by the committee to plan the next step.

The marketing segment of the oil industry is keenly interested because it feels that the co-ops are getting an unfair advantage.

Marketing representatives put it this way: Oil co-ops should either be taxed on the same basis as oil jobbers or, conversely, jobbers should be given the tax advantages the oil co-ops now enjoy.

Obviously, the oil jobbers don't have any real hope of getting their tax load eased, so what they are really after is to see that a similar burden is put on the oil co-ops. That, they say, would put the competitive race on an equal footing.

The sore point with oil marketers (and others) is that co-ops have tended to expand far beyond the original intent of the cooperative movement and that they are now, in fact, rival commercial business organizations which still get the tax advantages of the original farm co-op.

Competition cited . . . Oil marketers say that the proof of this advantage is seen in the booming growth of the co-ops. In many areas they have become a major competitive problem.

During the hearings, a Treasury Department official explained the basic problem involved.

"Broadly speaking," he said, "the major tax difference between cooperatives and other forms of doing business lies in the special treatment which cooperatives enjoy with respect to amounts allocated as patronage refunds or dividends.

"Ever since 1914, cooperative organizations have been allowed to exclude from gross income patronage refunds paid or allocated to patrons on the basis of business done with the cooperative if such payments or allocations are made pursuant to preexisting contractural obligations.

"This treatment is based upon longstanding treasury rulings which hold that the refund payments or allocations are to be regarded as discounts or rebates which reduce the taxable net income of the cooperative."

But many observers, including some U. S. tax officials, are convinced that co-ops are able to "use" this ruling to camouflage net income.

Thus, in actual practice, an average co-op pays more than half of its patronage refunds in non-cash or "paper" dividend form. These paper dividends may take the form of capital stock, interest or non-interest bearing certificates which may or may not have due dates. Or it may merely be a notification to the patron that he has received "credit" upon the books of the organization.

The net effect, therefore, is that the co-op is able to retain a substantial portion of its earnings and still avoid paying a tax on them.

Several marketing organizations, including the National Oil Jobbers Council, protested this sort of thing.

Some treasury representatives appeared, too, and indicated that the administration favors making some changes.

Carl F. Oechsle, assistant secretary of commerce for domestic affairs, also urged the committee to consider changes.

"There is ample indication that the cooperative movement is reaching out into new areas rapidly and that it is getting to be big business in many fields," he said.

"We therefore believe that now is the time to modify this tax advantage if it is indeed the intent and purpose of the federal Government to maintain fair and equitable opportunities and practices among competitors."

Proposed law . . . The treasury department's proposals have been incorporated into proposed legislation (H. R. 7875).

Basically, these would permit deductions only on patronage refunds paid in cash or in a document calling for a cash payment within 3 years. Interest would be paid during that time and the tax would be applicable as these documents were actually cashed in.

This, the department feels, would be a long step toward eliminating the "phony" patronage refunds which really are not refunds at all but are means by which the co-op is able to retain tax-free earnings.

Some marketers doubt that this is strong enough, but certainly they would prefer it over the present system.

Humble, OCAW Sign First Pact

HUMBLE Oil & Refining Co. has come to terms with the Oil, Chemical and Atomic Workers Union at the Baytown, Tex., refinery with a surprisingly small amount of friction.

The negotiations required 3 months to complete and represent the first time that the OCAW and Humble have worked out a labor contract. The OCAW displaced the old Baytown Employes Federation in an election last summer after workers had become dissatisfied with the BEF's progress on a new contract with the company.

The contract actually is much like the one which the company offered the BEF last summer.

It provides for wage increases for about half the 3,200 employes at the plant. The increases will average about 9 cents per hour for the workers involved.

Both the union and the company were happy with the final draft, which won overwhelming approval of the membership last week. The issue of work assignment and job classification, which has plagued other refiners during negotiations, apparently was worked out to mutual satisfaction.

Humble said it will maintain craft lines at Baytown. However, the contract realigned many duties to give more efficient use of personnel.

The key paragraph in the contract for the union states: "In prescribing or altering duties, the company agrees not to arbitrarily take skilled work traditionally performed by one maintenance and construction craft and give it to another craft. It agrees to maintain the identity of individual craft departments."

The number of job classifications was scaled down to 13 in maintenance and 9 in operations, far fewer than before and perhaps the fewest in any major refinery in the country.

NEW WELDED DERRICK

DESIGNED FOR DRILLING FROM A FLOATING VESSEL

Lee C. Moore Corporation has developed a new welded section type derrick designed specifically for drilling from a floating vessel.

The welded section design reduces the number of connections in the structure to a minimum, which permits the derrick to better withstand the reversal of forces imposed by the rolling action of a floating vessel.

This new derrick is 140′ high x 30′ square base and is composed of 16 welded sections with pin connections.

Another unique feature of the Moore derrick is a vertical track and roller device which acts as a guide to keep the traveling block from swinging.

The Moore derrick is designed to withstand actual wind loads of 100 M.P.H. with a full pipe setback, and has a gross capacity of 952,000 lbs.

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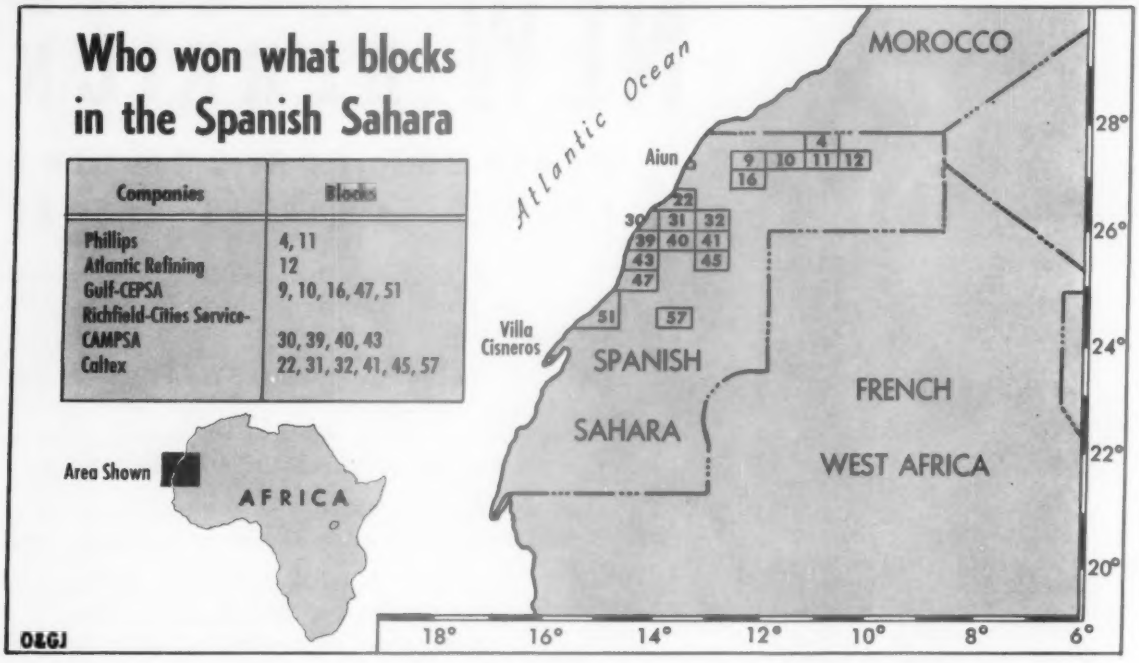

First Awards Made in Spanish Sahara

● Five groups are given rights on 18 blocks totaling about 11 million acres. Biggest winners are those companies taking in Spanish partners. Only Phillips and Atlantic Refining plan to go without Spanish participation.

FIRST ROUND winners have been picked in the contest for drilling rights in the Spanish Sahara.

The Spanish Government has approved the award of 18 blocks to five groups of American companies.

Each of the blocks covers about 600,000 acres. The awards were made under a new oil law passed last year. Interest in the Colony, located on the western coast of North Africa, has been heightened by the Saharan finds in Algeria and Libya.

The biggest winners were companies that bid jointly with Spanish partners. Gulf Oil and a Spanish company, CEPSA, obtained five blocks, 9, 10, 16, 47, and 51. Each company has half interest in the venture.

A group composed of Cities Service, Richfield Oil, and Spanish interests was granted four blocks, 30, 39, 40, and 43. Cities Service and Richfield Oil each have 35% interest. Spanish groups hold the remaining 30%, with CAMPSA holding the largest participation.

Caltex obtained six concessions, 22, 31, 32, 41, 45, and 57. The Caltex bid offered the Spanish Government a number of options for participation in a local Caltex exploration company, EPESSA. The government can name either a private or a government agency as partner. But its choice is expected to be a government agency.

Phillips Petroleum won two concessions, 4 and 11. It made its bid without partners, and has no plans to take other groups into its venture. Atlantic Refining was granted one block, 12. It does not have Spanish partners either.

The government has agreed to allow companies to concentrate their investment in the most promising areas. This will eliminate the need to spend a set amount on each block so long as the total expenditure amounts to the same over all minimum.

The rule covers concessions in Spain as well as the Spanish Sahara. This will give companies leeway in concentrating their work in either the mainland or in Africa so long as the investment equals the total specified for concessions in both areas.

More awards may be in the offing. Virtually every big American company, with the exception of Jersey Standard, applied for rights. Overlapping on the most promising areas was heavy, with a total of 162 applications made on 35 blocks.

CEPSA has filed new applications for four tracts 3, 65, 66, and 97. Standard of Ohio has made a bid for Concession 56. Magellan Petroleum and Oil Investments have made new proposals for 18 and 33.

Mainland awards . . . Two more awards were made for exploration permits in Spain.

Phillips Petroleum received 13 permits covering about 1,040,000 acres in the provinces of Soria, Valencia, Valladolid, Segovia, and Burgos. Richfield and Cities Service obtained three permits covering 240,000 acres.

The awards are the second to be made on the Spanish mainland under the new law. Gulf Oil and Diehlmann, a German firm, obtained 10 permits covering 104,000 acres late last year.

Sun Oil and Union Oil of California have two-thirds interest in 11 concessions covering 156,000 acres, awarded at the same time. Jersey Standard received 10 blocks covering 130,000 acres, and Caltex has an interest in seven permits covering 88,000 acres awarded to CAMPSA.

Venezuela May Be in the Oil Business Soon

- Perez Alfonzo lays plans for national oil company before advisory board.

Next it goes to Congress. Clear sailing for the proposal is expected.

A NATIONAL Venezuelan oil company, near and dear to the hearts of both President Romulo Betancourt and Dr. Juan Pablo Perez Alfonzo, is fast becoming a reality.

About all that could halt its formal birth would be a downright rebellion on the part of the country's strictly advisory National Energy Council. This is unlikely.

The draft of the corporate setup for the government company, Corporacion Venezolano de Petroleos, has been given the National Energy Council for study. The organizational setup was made by Dr. Perez Alfonzo, the country's militant minister of mines and hydrocarbons. The minister's draft made it plain that control of the company will be firmly in his hands or those who succeed him in the minister's post.

Once the National Energy Council approves the corporate draft it will be presented to the Venezuelan Congress. Little opposition is expected here. Even those who oppose President Betancourt on matters of political principles are in favor of a national oil company.

The only open opposition voiced so far came last week in an informal way from "Fedecamaras," the federation of chambers of commerce and production. Two members of this group's council plan to present the National Energy Council a written memorandum which says this is not the proper time for such action by Venezuela.

The memo will point out the world-wide surplus of crude supplies and contend that Venezuela's present financial condition would not allow it to make oil investments, even if the oversupply situation did not exist.

Dr. Perez Alfonzo last week brushed aside these arguments with the comment that the principle of a national company has been approved by everyone concerned.

Here are the primary points of the new organization now under study:

... **Full government** ownership rather than only government control. The parent national company may, if it chooses, form subsidiaries later in which outside capital could participate.

... **The minister** of mines and hydrocarbons will have the ultimate control of the company and its activities. Under the proposed articles of incorporation the company is "assigned" to the ministry. The minister, or his representative, will form the compan's general council and preside at meetings of this group which will lay down policy, approve budgets, and have final approval of any and all activities.

... **Assets of the** national company from its inception will be the government - owned, natural - gas pipelines linking Anaco and Caracas and Caracas and Valencia, plus all the distributions facilities.

These assets will be supplemented by capital appropriated by the government, plus proved national reserve acreage for oil and gas development.

In this respect, Venezuela's national oil company would be unique from its birth. There are large areas of national reserve acreage in the country that directly offset productive fields operated by private oil companies. Few, if any, of these tracts would require any serious or expensive exploration work previous to development drilling.

... **Loans could be** made by the new company, which will be guaranteed by the government. It would also have the right to buy and mortgage property. Only when it goes above the $150,000 mark in spending will it have to have the approval of the minister of mines.

The corporate organization of the national company was drawn up by Dr. Perez Alfonzo and clearly bears the stamp of the President's approval.

President Betancourt recently pointed out that Venezuela is one of only four Latin American countries which does not have a national oil company. He did not add that aside from Bolivia, Venezuela is the only Latin American country which has been able to satisfy its own oil needs.

Betancourt believes that Venezuela, with 30 years of oil activity, is qualified to run a national oil company, but he emphasizes—as he always has—that the company is not intended to interfere in any way with the operations of private companies or their oil markets.

Last week, the private Venezuelan oil industry watched the national company move closer to fruition and wondered.

Refinery Planned to Handle Paris Basin Crude

- PETROFRANCE would become an integrated operation if it builds plant to handle crude from Coulommes field.

PLANS ARE jelling for a 20,000-bbl. refinery in the Paris basin.

If the French Government approves the project, the Nahmias group will build the plant near Coulommes field, which it controls.

The proposed site is at Fublaines, on the Marne River, about 25 miles east of Paris. The town serves as a river terminal for Coulommes crude.

The Nahmias family owns PETROFRANCE, a local importer and marketer, which has 51% interest in PETROREP, the operator at Coulommes. The remaining 49% is held by the Rothchilds and various other French financial interests.

Nahmias plans are for a comparatively simple, $6-million refinery with crude distillation and catalytic reforming facilities. Feed stocks would be drawn from the Paris area, where production, most of it from Coulommes, is more than 6,000 bbl. daily. Other supplies will be imported from Gabon and Algeria.

The group is trying to borrow $4 million. If it is successful, and the government gives its permission, the refinery will be built by Fish Engineering Corp., of Houston.

A refining license would be the last link in a chain of interests making PETROFRANCE an integrated operation. In addition to its own marketing organization and its control of crude production through PETROREP, the company also has interests in transportation through control of Petrotransports, ship brokers, and Petrotankers, ship owners.

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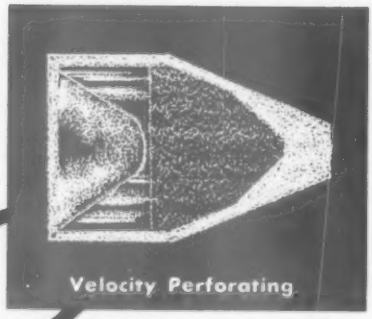
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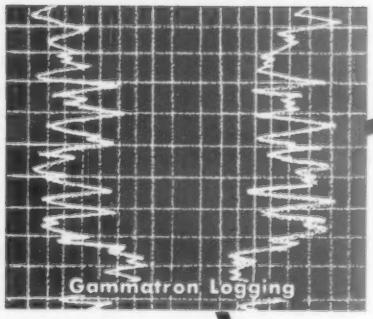
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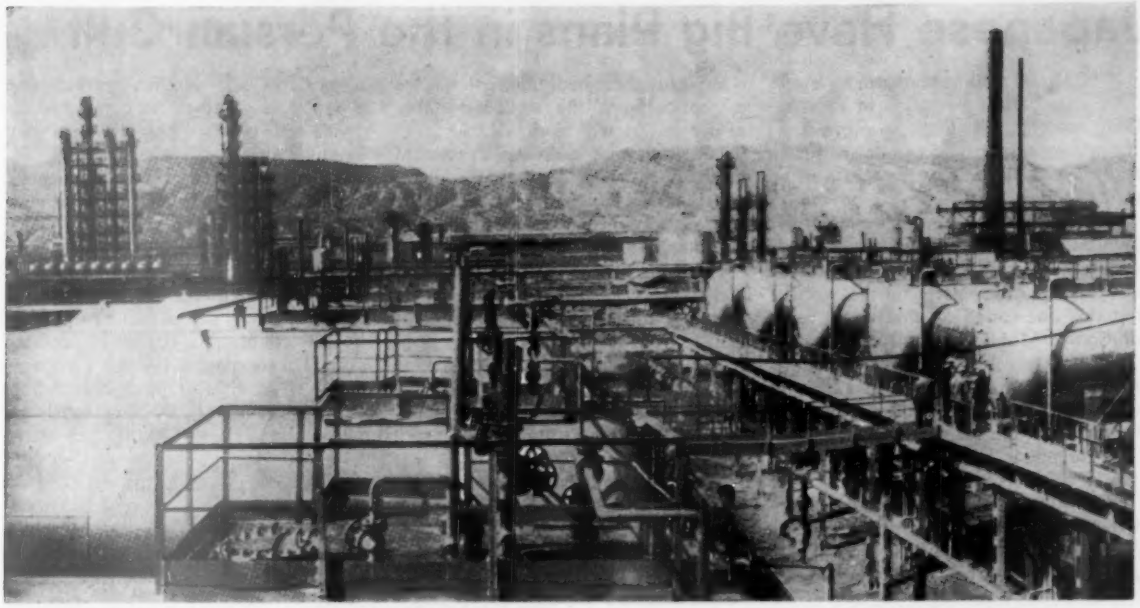


COMMUNIST China's biggest refinery (20,000 bbl. daily capacity) is now on full production. Built with Russian material and know-how, the . . .

Lanchow Refinery Is Pride of Red Chinese

RED CHINA'S biggest, and first automated, refinery has reached full-scale production, and major changes are already showing up in the country's oil-distribution system.

The 20,000-bbl. Lanchow refinery is a show piece of the industry-minded government. Russia built the plant for China on the banks of the Yellow River in northwest China. Work started 4 years ago, and runs to stills reached design capacity for the first time in January.

The Chinese do not say whether all downstream facilities are yet on production. These include a catalytic cracker, a propane deasphalting unit, and other equipment needed to produce a full range of products, such as aviation gasoline and lubricants. The major product is expected to be motor gasoline. Russia supplied blueprints for the plant along with 85% of the material and equipment and construction supervision.

The refinery is ending the need to send crude from northwest China on a long haul to Shanghai and other coastal points. These trips covered thousands of miles by truck, rail, and barge.

Most crude sent to Lanchow makes a shorter, 400-mile trip from Yumen fields to the northwest. It is transported to the refinery via the new Lanchow - Sinkiang railroad. Small amounts of crude, however, arrive via truck from Karamai oil field, north of Yumen, and from Tsaidam basin, northwest of Lanchow.

The Chinese had the good fortune to discover Karamai and Tsaidam fields after plans already were made for the Lanchow plant. Because of new supplies, construction work is going forward on a program scheduled to raise capacity to 100,000 bbl. daily by the end of 1962.

A railroad is being built to carry oil from Tsaidam to the refinery, and larger supplies from Karamai will start moving to the plant when an extension of the Lanchow-Sinkiang railroad is completed. Karamai is the country's best field. It enabled Chinese production to pass the 60,000-bbl.-daily level last year.

The railroad network is planned as a temporary measure. Pipeline links to the refinery are planned.

YPF Quits Importing Crude

• Argentina's oil agency will supply its refineries with its own production in the future. Only crude coming into country will be for private-owned plants.

ARGENTINA'S state oil company has imported its last tanker of crude.

Foreign crude will still be coming into the country. But this oil will be brought in by local affiliates of Jersey Standard and Royal Dutch-Shell, whose production from old properties supplies only a small fraction of the capacity of their respective refineries.

YPF has stopped buying crude for its own plants. These have a rated capacity of 169,400 bbl. per stream day. But actual throughput last year averaged only about 131,000 bbl. This is now being supplied by YPF and by foreign firms under contract.

The final shipment was brought in from the Persian Gulf by British Petroleum. A contract between BP and YPF for shipments of oil through 1962 has been changed to shipments of products only.

YPF is also hopeful that its imports of fuel oil will end this month. It says it will now start supplying crude to refineries owned by Jersey and Shell companies, and it looks toward the day when imports of crude into the country will stop entirely.

Plants owned by Jersey and Shell have capacity rated at 80,600 bbl. daily.

Japanese Have Big Plans in the Persian Gulf

A MOBILE drilling platform hovered over a new drilling location in Persian Gulf waters last week waiting for choppy seas to settle down so the platform legs could be lowered and a new well spudded.

The Letourneau-type platform, owned by a Tulsa drilling firm, is no different basically from a dozen others at work in other parts of the world, but this one found oil that could revolutionize Middle East oil operations. The platform last week was getting ready for a 2½-mile stepout southwest of the 6,000 bbl.-plus discovery made by the Japanese off the Neutral Zone. The stepout is in the direction of Safanifa field off Saudi Arabia.

The 6,000-bbl. potential revealed by the Japanese in Tokyo is conservative. The well will undoubtedly produce at a much higher rate.

May bring change . . . What is more important, the well could change a great many things in the Middle East.

When the Japanese made their radical 57-43 profit splitting agreement with Kuwait and a 56-44 deal with Saudi Arabia, they changed the pattern. Those changes were pretty academic up to now. But, with a commercial oil discovery, the new look is a reality.

The Saudi Arabian-Japanese deal calls for a profit split on an integrated operation. Sheikh Abdullah Tariki, the Saudi oil expert, now has a chance to see if his cherished dream of a share in profits from the wellhead-to-the-service station will work.

The Sheikh of Kuwait isn't as sold on the idea as is Tariki. His agreement with the Japanese calls for a separate accounting of the profits from marketing, if any.

The thing that has long chafed Tariki is that his government, like all producing countries, gets a 50-50 split of profits from production alone. Producing companies in the Middle East say Tariki has a very exaggerated idea of the profits they make on operations after their oil leaves Saudi Arabia.

Exactly how the Japanese and the Arab countries who share in ownership of the Neutral Zone will determine the integrated profits is still not clear. The newly organized, Japanese owned Arabian Oil Co. has no refining facilities or assured markets in Japan or anywhere else.

There is little doubt, however, that Japanese Government backing assured last week will help solve some of the marketing problems (OGJ, Feb. 8, p. 74). As long as the Japanese Government backs the company financially, it certainly will use its influence to see that Japanese markets open up for the Persian Gulf crude. All Japanese oil imports hinge on foreign exchange quotas which must be obtained from the government.

Just how a second company, which refines this oil and then markets the products is going to be compelled to divide its profits with Kuwait and Saudi Arabia is still the big question.

Tokyo reports last week indicated that Arabian Oil is already considering building its own refinery at Yikkaichi on Japan's Pacific Coast.

Future production . . . In the meantime, the newly prosperous company is happily counting its barrels of production. Tokyo reports say the company plans to produce at least 40,000 bbl. daily in 1961; 160,000 bbl. daily in 1963; and at least 172,000 bbl. daily in 1964.

The company plans to drill eight or nine more wells this year and a total of 43 by 1964. The new 2½-mile stepout represents a change in plans since the discovery was made. When the first location was staked last spring, the Japanese marked a second and third about 10 miles apart in a west-northwest line (OGJ, July 6, 1959, p. 88). At least they are moving fast.

Whether the governments of Kuwait and Saudi Arabia can expect to get more money from the Japanese operation under its unique terms than they now get from large scale 50-50 splits on production alone remains to be seen. In the meantime, both governments are happily awaiting the $2 million each in bonuses which the Japanese firm must pay within 60 days after the date of the discovery.

Indonesian Rebels May Snag Oil Deal

JAPANESE trying to make a deal for oil from fields in North Sumatra are finding that the Indonesian revolution is far from over.

Rebel leaders are warning that any contract between Permina Oil Co. and the Japanese must include an agreement with them. Permina Oil is a state-owned company that took over fields in North Sumatra held by Royal Dutch-Shell before World War II. Shell never was permitted to reenter the properties.

A frontal assault on the central government fell flat 2 years ago. But rebel forces have never been completely defeated, and they continue to harass the government.

Japanese groups for years have dickered with Permina Oil for a deal on the North Sumatra production. Details of a newly reached agreement are not known. But Permina Oil is receiving a 10-year loan to develop the fields, to be repaid with oil.

The first shipment of 130,000 bbl. of crude was sent to Japan last month. The second shipment, of 145,000 bbl., is scheduled to sail this month. Permina hopes the shipments will average 20,000 bbl. daily this year.

Rebel forces, however, have warned that the Japanese must also come to terms with them. If they do not get a satisfactory cut, they threaten to sabotage field installations.

Libyan Well Tests 450-500 Bbl. Daily

OASIS OIL CO. last week confirmed what has been conceded for weeks by the Libyan oil industry—it has a discovery in a big block of acreage in the northwestern part of the country.

The company has tested A1-26 at the rate of 450-to-500 bbl. daily of 40°-gravity, water-free crude from an interval found at 5,725 ft. The well also produces gas at the rate of 1,300,000 cu. ft. per day.

The wholly owned subsidiary of Ohio Oil Co. acts as operator on the Libyan acreage held by Ohio, Continental Oil Co., and Amerada Petroleum Corp.

The big 20,678-sq.-mile Block 26 is technically in Amerada's name, but the wildcat now being completed by Oasis is the first test drilled on the acreage. First reports of the discovery were made months ago when the Libyan industry conceded Oasis a producer based on the "substantial show" reports from the well at about 5,700 ft. (OGJ, Nov. 30, 1959, p. 56).

Unitization

How to get your units formed faster

By Marshall W. Myers

. . . staff engineer for unitization for Sinclair Oil & Gas Co., Tulsa. Myers has been involved in 140 separate unitization efforts since 1954. There have been 58 units formed in this period; 67 are still under negotiation, and 15 have been abandoned. Myers has served as chairman of the steering committee for the Southeast New Hope Gibson Sand unit, Garvin and McClain counties, Oklahoma, and the North Madill Bromide Sand unit, Marshal County, Oklahoma, which became effective January 1, 1960. Myers holds a bachelor of science degree in petroleum engineering from the University of Pittsburgh, and a master of business administration degree from the University of Tulsa. This article has been prepared from his thesis for this latter degree.

The author declares:

Much has been written about unitization, but most of it has dealt with the results to be gained from a unit, or the results that have already been realized, or with the legal aspects of unitization.

It is the author's opinion that there has never been an article, book, or other writing that includes a comprehensive treatment of the actual procedures to be followed in the formation of a unit for the production of oil or gas.

That unitization is important is best shown statistically. As of January 1, 1959, there were 756 unitized projects in operation in the United States, compared to 92 such projects in 1952. This number is growing every day.

Unitized production is responsible for most of the oil produced from secondary-recovery and pressure-maintenance operations. This appears normal, because the more efficient production mechanisms involving secondary recovery and unitization can hardly be considered equitable without the formation of a production unit.

It follows, therefore, that unitization is a desirable objective. It is permitted and encouraged by the petroleum regulatory bodies in various states, and it is generally accepted as good operations practice by industry.

But how is a unit formed? What steps are involved? What coordination is required? How does management fit into the picture? What detailed planning is necessary?

It is the purpose of this article to answer these questions. A discussion of the activities of management and the several committees and subcommittees normally taking part in the unitization effort is included.

—*Marshall W. Myers*

If you want fast action on unitization . . .

- Follow the advice of an expert.
- Be sure your delegates are informed.
- Give them the authority to act.
- Then use these suggestions to organize the unit.

THE PETROLEUM INDUSTRY has developed a method whereby all interests in an oil field may be merged, and the entire petroleum reservoir developed and operated as a single property. This method is known as unitization or unit operation.

The unit plan of operations contemplates either voluntary or forced pooling of all interests in properties producing from the same reservoir or common source of supply, and operation of the group of properties as a unit.

Unitization may be further defined as the unitized management, operation, and further development of a common supply of oil and gas, for carrying on pressure maintenance, repressuring operations, water-flooding operations, any combination of these, or any other form of joint effort calculated to substantially increase the ultimate recovery of oil and gas.

Units are created

Units may be created by the execution of a community lease, by the use of the rights granted by the pooling clause in an oil and gas lease, by the voluntary execution of a unitization agreement, or by an order of a state regulatory body under a compulsory-unitization statute. This article is concerned with the procedures used in creating units field-wide in scope, as contemplated by the latter two.

The voluntary unit . . . This involves taking affirmative joint action upon the part of those interested in the development and operation of an oil and gas field as a unit or cooperative project, to agree upon the terms and conditions of such an operation, and to complete the formation of the unit or cooperative project.

The voluntary unit is the result of an agreement among the lessors, the lessees, and those owning oil and gas rights in the unit area, with the express approval of a statute which authorizes an agreement for unitized operations if the state in which the unit is located has such a statute, or without the approval of a statute if the state has none.

To remove the doubts which exist as to the application of antitrust and monopoly laws and procedures to voluntary unit plans of development, operation, and management, many jurisdictions have statutes which authorize the adoption of such a voluntary agreement, and which grant a specific exemption from the application of the antitrust and monopoly statutes to those participating in the plan.

The compulsory unit . . . This is the joining together into a unit, as the result of an order of a state regulatory agency, of all the lessee and royalty interests in a common source of supply of oil and gas; thereafter, under the terms of the agreement, the unit is operated as though there was but a single lease and a single operator, with the production of oil and gas being distributed equitably among the lessee and royalty interests in accordance with the formula for participation or allocation.

Compulsory unitization is "compulsory" in the sense that if the majority of the owners of the leasehold interest and mineral interest, as defined by statute, have consented to the unitized project, and all other requirements of the statute have been met, as determined by the regulatory agency upon notice and hearing, the unit will be created and forced upon the nonconsenting lessees and mineral owners of the lease.

Requirements

It is not to be assumed that unitization is a cure-all to be resorted to when development and lifting costs are high, when production is decreasing, when pressures are dropping, or when gas-oil ratios are increasing. Like any other engineering technique, unitization has a particular application, based on certain existing or predicted conditions, to be used for a specific purpose.

Prepared as a thesis and submitted to the Department of Management of University of Tulsa as a requirement for the degree of master of business administration, 1959, under the original title, "Suggested Procedures to Facilitate the Unitization of Oil and Gas Fields."

It is not within the scope of this article to discuss the various conditions existing in oil and gas fields which dictate unitization. It is necessary only to point out that unitization is based primarily on engineering and management considerations. To illustrate what is meant by engineering and management considerations, the following is extracted from the Oklahoma compulsory unitization statute:

Section 287.3. MATTERS TO BE FOUND BY COMMISSION—REQUISITES OF PETITION

If upon the filing of a petition therefor and after notice and hearing, all in the form and manner and in accordance with the procedure and requirements hereinafter provided, the Commission shall find

(a) That the unitized management, operation and further development of a common source of supply of oil and gas or portion thereof is reasonably necessary in order to effectively carry on pressure-maintenance or repressuring operations, cycling operations, water-flooding operations, or any combination thereof, or any other form of joint effort calculated to substantially increase the ultimate recovery of oil and gas from the common source of supply; and

(b) That one or more of said unitized methods of operation as applied to such common source of supply or portion thereof are feasible, will prevent

waste and will with reasonable probability result in the increased recovery of substantially more oil and gas from the common source of supply than would otherwise be recovered; and

(c) That the estimated additional cost, if any, of conducting such operations will not exceed the value of the additional oil and gas so recovered; and

(d) That such unitization and adoption of one or more of such unitized methods of operation is for the common good and will result in the general advantage of the owners of the oil and gas rights within the common source of supply or portion thereof directly affected, it shall make a finding to that effect and make an order creating the unit and providing for the unitization and unitized operation of the common source of supply or portion thereof described in the order, all upon such terms and conditions, as may be shown by the evidence to be fair, reasonable, equitable and which are necessary or proper to protect, safeguard, and adjust the respective rights and obligations of the several persons affected, including royalty owners, owners of overriding royalties, oil and gas payments, carried interests, mortgages, lien claimants and others, as well as the lessees.

Certain key words in the foregoing should be particularly noted, such as: unitized management; reasonably necessary; to effectively carry on; calculated to substantially increase; methods . . . are feasible; will prevent waste; increased recovery of substantially more oil and gas; additional cost . . . will not exceed the value of the oil and gas so recovered; such unitization . . . is for the common good. Compulsory unitization statutes of other states contain similar provisions, as do the regulations governing the formation of voluntary units. These statutes and regulations would seem to effectively eliminate unitization merely for the purpose of obtaining decreased lifting costs for the operators through unit operations.

It may be assumed, therefore, that unitization can be resorted to, with the approval of state regulatory authorities, only when the unit operation will result in increased recoveries of oil and gas, and when the operation is economically feasible. Thus, engineering and economic considerations are of paramount importance.

The engineering study

In many fields, an engineering committee, composed of engineering representatives of each of the operators, is formed early in the life of the field. If such is the case, this committee will be constantly accumulating and tabulating data, and making studies which will provide a basis for steps to increase recoveries, decrease lifting costs, or make other improvements in operating conditions. Quite frequently, a recommendation that the field be unitized will evolve from the studies of this committee.

All major oil-producing companies and most independents have within their organizations petroleum-engineering and economic-analysis sections that are constantly studying the fields in which they have an interest. The activities of these groups are similar to the field engineering committee discussed above, except for being more or less confined to the operators' own properties. Quite frequently, however, a study of individual properties will indicate the desirability of a field-wide study and with data furnished by the other operators, one operator will make such a study. This will often result in a recommendation that a field be unitized.

A third situation would be where all operators in a field, or most of them, are plagued by decreasing production, increasing lifting costs, rapidly increasing gas-oil ratios and falling reservoir pressures, and indicated low-percentage recovery of the oil in place in the reservoir. Here the operators, having a common interest and problem, may meet at the call of one of them and establish an engineering committee or employ a consulting engineer to study the problem and recommend a solution. Unit operation, for the purpose of pressure maintenance or secondary recovery, may be recommended in this study.

There must be a basis for a recommendation that a field be unitized. Failure to make such a prior study, at least on a summary or preliminary basis, can result in a poor beginning of the unitization negotiations. In other words, there has been a tendency in some instances to initiate engineering studies after unitization negotiations are started. Such a procedure is undesirable, as unitization should be an outgrowth of an engineering study.

To avoid confusion, remember that the activities of the engineering subcommittee in the unitization effort are separate and distinct from the preparation of the prior engineering studies discussed above. The activities of the engineering subcommittee will be covered later.

Management considerations

Unitization of an oil and gas field is a cooperative undertaking, even in those states having compulsory unitization statutes. Thus, little can be accomplished toward carrying on and completing the unitization effort without the understanding and endorsement of the managements of the various operators involved. It is of utmost importance, then, that the department or section within the company which is primarily responsible for unit negotiations keep management informed of developments on major issues. These may include estimated increases in ultimate production and net income, effects of the unitization on current income, necessary cash outlays—present and future—and personnel changes that will result.

In the early stages of development of the unitization idea, many operators opposed unit plans because of their conflict with certain established policies of management, and their possible involvement in antitrust litigation. Today, however, the application of the unitization concept has become so widespread, and the benefits obtained have been so favorable, that managements of most companies have geared their thinking, and their organizations, to a furtherance of this concept. Management, however, must be sold on each separate project if the unitization effort is to proceed smoothly to a successful conclusion. Thus, engineering studies must be reasonably favorable, management must be kept informed, and concurrence of management obtained on all major issues being negotiated.

Management's responsibility . . . Management has a responsibility which often is neglected. In the negotiation of the provisions to be included in the unitization agreement and in other important matters up for discussion by the unitization committees, delay and confusion result when interested parties send representatives to meetings not clothed with sufficient authority, or lacking sufficient stature, to commit their companies to a definite line of action or make on-the-spot decisions. It is realized, of course, that companies do not always have available men with experience and authority, when several meetings are being held simultaneously. However, arrangements should be made to have such men present when major issues are being negotiated, leaving to others the attendance at routine meetings.

Another important management consideration is that of a company policy on unitization matters. With operational activities decentralized as they are in most major companies today, there often is no established policy or guidance furnished by the

general office. Such an omission can lead to delay, confusion, loss of confidence, and, in some cases, some decrease in potential earnings through failure to negotiate an equitable participation or to include other desirable provisions. In many matters, an established policy must be flexible, unitization being, to a certain extent, a matter of give and take. However, the need for a policy to serve as a yardstick or guidepost for those engaged in unit negotiations should be self-evident.

The importance of two-way communication between management and the unitization staff cannot be overemphasized.

Planning and coordination

For the purpose of this article, it will be assumed that an engineering study, recommending unit operation of a field, has been made. This study may be preliminary only, but in sufficient detail to justify a conclusion that unit operation should result in additional recoveries, using pressure maintenance, water flooding, or other secondary-recovery methods.

An initial and necessary step, following the completion of this engineering study, is to obtain concurrence of the initiating company's management in the conclusions and recommendations and to the calling of a meeting of operators to discuss the proposed unitization. If the study has been prepared by company personnel or by a consultant employed by the company, concurrence also should be obtained from management to release copies of this study, or a summary of pertinent points, to the other operators at the time a notice of a meeting is sent.

Reasonable time must be allowed the other operators for review of the study before the meeting. These other operators, in turn, have the obligation to review this study, make such additional studies as they deem necessary and desirable, and reach a management decision as to whether they will cooperate in the unitization effort, so that they may make their position known at this initial meeting.

The initiating company must make definite plans for continuation of the unitization effort, if enough operators indicate their desire to cooperate in the effort. An agenda for the initial meeting must be prepared, company representatives to serve on the various committees and subcommittees must be decided on, a suitable meeting place must be arranged, a proposal covering actions of the steering committee and the sharing of expenses incurred in the unitization effort should be prepared, and such other prior planning and actions taken as will assure a smooth beginning.

Coordinated effort . . . It is evident from the foregoing that coordination among the various departments of the initiating company, before the initial meeting, is required. A meeting of

Blank Oil Co.
Anytown, U.S.A.

To: ALL OPERATORS
PROPOSED SOUTHEAST FRANINGHAM UNIT

Re: Operators meeting
Proposed Southeast Framingham unit, Anystate

Gentlemen:

As operator of properties in the Southeast Framingham area, we feel that the need for unitization of certain acreage and the necessity of pressure maintenance is acute. In view of this, it is our desire to call a meeting of the operators of the proposed area so that all matters pertaining to the area development may be properly discussed and the necessary committee formed.

We wish, therefore, to call a committee meeting for all operators of the area to be held in our offices at 10:00 a.m. May 19. We urge each operator to have a representative present at the meeting.

For your information, we enclose for each of you a copy of the agenda for the meeting and a map outlining the proposed area.

Very truly yours,

John E. Doe

AGENDA

PROPOSED SOUTHEAST FRANINGHAM UNIT

1. Formation of operators' committee for proposed Southeast Framingham unit, covering the tentative area outlined on the attached map.

2. Discussion of proposed unit area shown on attached map in order that operators may agree in principle to the area.

3. Discussion by R. F. Roe, Blank's land department, as to plan of unitization for the compulsory unit area and the voluntary unit area.

4. Discussion of development program for the proposed unit area, primarily in regard to the drilling of the undeveloped area.

5. Formation of a geological subcommittee and delegation of work assignment to this committee, such as determination of possible productive area, and preparation of structure and isopachous maps.

6. Formation of engineering subcommittee to study and recommend a pressure-maintenance program and a participation formula.

7. Discussion of method of adjustment of investment of wells committed in the proposed unit area.

8. Formation of legal subcommittee.

9. Formation of land subcommittee to study best approach to obtain royalty interests' consent to the unit.

10. Formation of accounting subcommittee.

11. Any other matters.

LETTER to operators calling unitization meeting should include agenda. Fig. 1.

representatives of the production, legal, accounting, lease, geological, gas, and gas-products departments should be called. Normally, the representative of the production department will preside at this meeting, and will brief the other representatives on the proposed unitization project. Early information to the various departments is desirable, so they may plan for any additional work load that will result during the unitization effort, and after its completion.

Fig. 1 is an example of the letter that could be mailed to all operators, calling a meeting to discuss unitization of the field. Attached to this letter is a sample agenda for the meeting.

"It is important that an early determination be made of the working-interest ownership in the field."

It is important that an early determination be made of the working-interest ownership in the field, so that the owners of such interest can be informed of all meetings and other matters pertaining to the unitization. Though such owners may not be operators, their approval may be needed before the unit can be formed. Also, good business practice demands that nonoperating business partners be kept informed. Nonoperators should be invited to attend meetings, even though ordinarily they are satisfied to let their operating partners speak for them.

Conduct of meetings

All meetings of the various committees are conducted in accordance with parliamentary procedures.

The representative of the initiating company usually is acting chairman of each committee, until a chairman is elected by the members of the committee at their first meeting.

The method of voting, that is, the percentage required to pass any proposed measure, and the weight accorded each representative's vote, should be established early in the first meeting. In the matter of voting, there is some divergence of opinion as to the weight that should be accorded each representative's vote.

Some feel that during the unitization effort, all companies should have an equal standing, thus preventing the companies with large interests in the field from influencing or controlling all action. In most cases, however, it appears that large ownership should carry weight. Thus, weight of the vote cast by each operator's representative is normally in proportion to some readily determinable factor, such as number of wells, surface acres, or current production. A certain amount of protection can be provided the smaller operator by wording the voting provision somewhat as follows:

> "The committee shall act upon and determine all matters coming before it by an affirmative vote of three or more representatives of operators having at least 65% of the total voting interest; provided, however, that should any one operator have more than 35% of the total voting interest, its vote shall not serve to defeat any proposal under consideration unless said vote is supported by the vote of one or more other operators having at least a total of 5% voting interest."

It should be realized that until the unit becomes effective, no operator is legally bound to abide by the majority rule in any committee voting procedure. The purpose of voting in the preunitization meetings is to determine the desires of the majority, and its value lies in the general tendency of operators to go along with the majority. This is not always the case, however, and some unitization efforts fail completely because a relatively few operators fail to agree with the majority. It is again emphasized that the success of a unitization effort greatly depends upon cooperation of the companies involved.

Minutes covering discussions and actions taken at all meetings should be prepared and distributed to all working-interest owners. The minutes need not be a verbatim record of all the proceedings, but should show:

1. The names and company affiliation of the members present.
2. All motions and resolutions offered or acted upon, together with the results of such action.
3. Other formal actions taken by the committee.

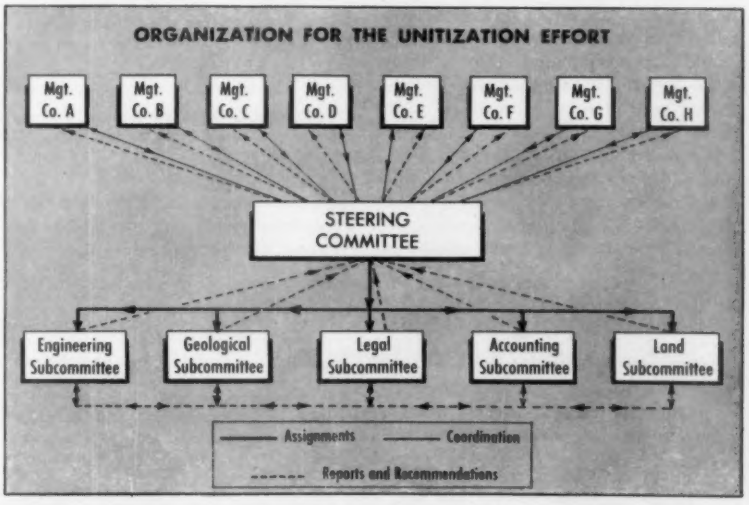
Committees

The unitization effort requires several different, but related, activities, engaged in by various specialties or professions. There are management problems, and geological, engineering, land, accounting, legal, and perhaps plant-engineering specialties involved. Thus, it is reasonable to assume that committees should be formed to work out the unitization problems involving each of these.

The over-all coordinating committee, which represents management and is primarily responsible for completing the unitization, may be called the steering committee. Its function is to steer or guide the efforts of its members and the various subcommittees toward the ultimate goal—unitization.

All the subcommittees receive their charges or assignments from the steering committee.

So that the subcommittee may subdivide their work assignment, or carry



COMMITTEE DIAGRAM indicates the flow of assignments, reports and recommendations, and coordination. Fig. 2.

out specific tasks by a smaller number of workers, it is customary for them to establish work groups. These work groups may be titled engineering work group, geological work group, etc., and work under the direction of, and report to, the entire subcommittee.

While the unitization effort involves many different specialties, and several different groups working simultaneously, all of these activities culminate and are tied together in the unitization agreement and its execution by the various interest owners. Thus, coordination between the subcommittees and work groups is of paramount importance. Most certainly, here the left hand must know what the right hand is doing. Fig. 2 shows a typical organization of the steering committee and subcommittees, and shows the flow of assignments, reports and recommendations, and coordination.

At the initial meeting of operators' representatives called to discuss unitization, if enough operators are in favor of attempting unitization of the field, the steering committee will be formed and a chairman elected. Normally the representative of the initiating company will be elected chairman. However, in some instances, the initiating company is a minor-interest owner in the field, and it may be more desirable to elect the representative of the major-interest owner as chairman, if such major-interest owner is willing to accept the responsibility.

The steering committee

The steering committee represents management. In some instances, in large and especially important unitization projects, members of management will actively serve as representatives on the committee. This, however, is the exception rather than the rule.

Representatives on the steering committee should maintain close liaison with their respective managements on all major issues, so committee action will not be delayed, and to avoid the embarrassing situation which can arise when a representative has to recall his affirmative vote on a major issue, because of management's nonconcurrence.

It was stressed earlier that much delay and confusion can result when operators send representatives to meetings without sufficient authority or lacking the required experience and ability to commit their companies to a definite line of action or make immediate decisions. To have the proper-caliber individuals serve on all committees is important, but is most important as regards the steering-committee representative. This is so, since the steering committee, being the top committee, represents management. It should be anticipated that actions taken by this committee will be approved by the managements of most of the operators.

It has been found a desirable practice to have the chairmen of the various subcommittees sit in on the meetings of the steering committee, to answer first hand specific questions that may arise, and to become better acquainted with the problems confronting the steering committee.

STEERING COMMITTEE

MEMBERSHIP:	One representative for each interested working-interest owner.
CHAIRMAN:	Elected by members. Term indefinite.
SECRETARY:	Optional. Appointed by the chairman. Term indefinite.
DUTIES:	(1) Prepare and approve articles of organization.
	(2) Establish necessary subcommittees, and make work assignments to these subcommittees.
	(3) Coordinate work of subcommittees, as required.
	(4) Receive and consider periodic or interim reports from subcommittees. Give subcommittees such additional guidance as is necessary.
	(5) Receive, consider, and take action on all recommendations of subcommittees.
	(6) Reach agreement on all issues pertaining to the unitization.
	(7) Expedite the formation of the unit. Take such followup action as is required.
VOTING:	Basis for determining value of each representative's vote, and required percentage to carry a proposal, to be determined by agreement. Details, if any, of negative or pass votes to be supplied in minutes.
REPORT TO:	Each representative reports to his respective management.
NOTE:	The above is intended only as a guide. It may be found desirable to incorporate much of the detail concerning the above in an articles of organization.

STEERING COMMITTEE should be composed of members who have enough authority to commit their companies to a definite line of action or make decisions. Fig. 3.

The organization and duties of the steering committee are indicated in Fig. 3.

The accounting subcommittee

Most unit agreements, in a section entitled "Unit Expense," or "Development and Operating Costs," contain a provision reading essentially as follows:

> "The unit operator initially shall pay and discharge all costs and expenses incurred in the development and operation of the unit area. All such costs and expenses shall be in accordance with this agreement and the attached accounting procedure. Working-interest owners shall reimburse unit operator for all such costs and expenses, in proportion to their respective unit participation."

In another part of the agreement, under "Adjustment of Investment" normally will be found a provision that "working-interest owners shall inventory and evaluate in accordance with the accounting procedure the personal property taken over by the unit."

Preparing an accounting procedure and providing for an adjustment or equalization of investment constitute the primary responsibilities of the accounting subcommittee.

The accounting subcommittee's work usually is quite routine; thus normally it need not start functioning during the earlier phases of the unitization effort. However, should it be decided early in the effort that intangible drilling and development costs are going to be, or are likely to be, taken into account in the adjustment of investment, this subcommittee should be organized and go to work immediately on the determination of these intangible costs. Such a determination can be a time-consuming process.

There are several good forms for accounting procedures. An especially good procedure is that prepared by the Petroleum Accountants Society of Oklahoma, identified as "PASO-T-1955-2, Accounting Procedure (Unit and Joint Lease Operations)." This form, with infrequent minor modifications, is now being used in most units being formed in the United States.

The composition and duties of the accounting subcommittee are shown in Fig. 4.

The geological subcommittee

The geological subcommittee normally is established at the initial meeting of the steering committee, and is given an immediate work assignment.

The extent of the subcommittee's studies is dependent in part on the specific assignment given it, on other studies that already have been made, and on the amount and type of geologic data available. If a complete engineering study already has been made by the initiating company, by a field-engineering committee, or by a consultant, much of the subcommittee's work will consist merely of checking the analysis already made.

If the field proposed for unitization is many years old, it may be that very little geologic data, such as modern electric logs, are available. This could greatly limit the extent of the geological study.

It may be determined very early in the unitization negotiations that geologic factors will not be used in establishing a basis for participation in the unit. Thus, the primary assignment of the geological subcommittee may be only the relatively simple task of preparing a structure map of the reservoir. On the other hand, the duties of the subcommittee may be many and extremely complex in nature, requiring exhaustive research, compilation, and analysis.

The composition and duties of the geological subcommittee are shown in Fig. 5.

ACCOUNTING SUBCOMMITTEE

MEMBERSHIP:	One representative for each interesting working-interest owner.
CHAIRMAN:	Elected by members. Term indefinite.
DUTIES	(1) Prepare an accounting procedure. (2) Prepare provisions on adjustment of investment, for inclusion in unitization agreement. (3) Determine intangible drilling and development costs, if required. (4) Prepare miscellaneous provisions for unitization agreement, including: (a) Periodic inventories (b) Limitation on expenditures by unit operator (c) Budgets (d) Audits (e) Method of billing (f) Disposition of surplus facilities (g) Maintenance of proper accounts (h) Others, as required (5) Furnish general accounting advice to the steering committee. (6) Coordinate studies with the engineering subcommittee. (7) Complete special projects, as requested. (8) Furnish results of completed assignments to the steering committee.
VOTING:	Majority vote.
REPORT TO:	Chairman of steering committee.

ACCOUNTING SUBCOMMITTEE provides investment adjustment. Fig. 4.

GEOLOGICAL SUBCOMMITTEE

MEMBERSHIP:	One representative for each interested working-interest owner.
CHAIRMAN:	Elected by members. Term indefinite.
DUTIES:	(1) Determine productive limits of the reservoir. (2) Accumulate geological data on wells. (3) Prepare subsurface structure maps of the reservoir. (4) Pick net effective pay for each well. (5) Construct isopachous map of the reservoir. (6) Furnish general geological advice to the steering committee. (7) Work, or closely coordinate activities and findings, with engineering subcommittee. (8) Assist in preparing evidence to be presented at hearing before state regulatory authority. One member, usually the chairman, will appear at hearing as expert geological witness. (9) Perform special projects, as requested. (10) Furnish results of studies and recommendations to steering committee.
VOTING:	Majority vote.
REPORT TO:	Chairman of steering committee.

GEOLOGICAL SUBCOMMITTEE is given early work assignment. Fig. 5.

The legal subcommittee

The primary duty of the legal subcommittee is to draft the unitization agreements so that these agreements are legally sufficient and legally acceptable for the purpose intended. Throughout the unitization effort, however, problems and questions arise which require a legal interpretation or ruling. It is here that attorneys can perform a valuable service in preventing engineering and other technical personnel from straying beyond the bounds of legal permissibility.

Law dealing with units is not general law. In fact, it is an important and specialized phase of oil and gas law, and one with which not even all oil - company attorneys are familiar. Thus, it behooves the lawyer assigned to the legal subcommittee, or who may be called on to review unitization agreements, to familiarize himself with the law as it applies to unitization.

Fig. 6 shows the composition and duties of the legal subcommittee.

The land subcommittee

Normal functions of the land department of an oil-producing company include the acquisition of land titles, usually by leasing, representing the company in negotiations with other oil companies and brokers in blocking up acreage in new prospective areas, arranging cooperative drilling and development programs, estimating values in land sales and purchases, and participating in the formation of units. With their training and experience in dealing with the various interest owners, it is entirely proper that the land men assist in completing the formation of a unitized project.

The unitization agreement must be submitted for approval to all owners of mineral interests in the proposed unit area. Included in this category are the owners of working interests, royalty interests, overriding royalty interests, oil and gas payments, and unleased lands.

In obtaining the approval of royalty owners, the chief factor in the success of this undertaking has been the trust that has been reposed in the companies involved and the belief of the royalty owner that the companies are submitting an agreement that is fair and equitable. This is so because most royalty owners have not in the past been conversant with unit agreements, and generally they have not been able to fully understand all of the complicated de-

LEGAL SUBCOMMITTEE

MEMBERSHIP:	One member for each interested working-interest owner.
CHAIRMAN:	Elected by members. Term indefinite.
SECRETARY:	Optional. Appointed by the chairman. Term indefinite.
DUTIES:	(1) General advice to the steering committee and other subcommittees regarding legal implications of actions contemplated. (2) Preparation of unitization agreements. (3) Attendance of chairman at all meetings of the steering committee. (4) Transmittal of minutes of meetings of subcommittees to chairman of steering committee. (5) Approve titles to tracts, if necessary. (6) Assist in securing interest owners' signatures to unit agreements, as required. (7) Preparation of application for hearing before state regulatory authority, and preparation of evidence to be presented. (8) Special projects as requested. (9) Keep legal representatives of all operators informed of all actions taken.
VOTING:	Majority vote, but details of dissenting minority opinion are always to be supplied in minutes.
REPORTS TO:	Chairman of steering committee. (By request, may report to chairman of subcommittees on specific projects)

LEGAL SUBCOMMITTEE drafts the actual unitization agreement. Fig. 6.

LAND SUBCOMMITTEE

MEMBERSHIP:	One representative for each interested working-interest owner.
CHAIRMAN:	Elected by members. Term indefinite.
DUTIES:	(1) Determine ownership in the proposed unit area, including owners of working interests, royalty interests, overriding royalty interests, oil payment interests, etc. (2) Have title search made, if necessary, to determine ownership and present status of oil and gas leases. (3) Prepare ownership lists showing interest owned by each party and total ownership in proposed unit area. (4) Prepare legal description of leases, for inclusion in unitization agreement. (5) Prepare plans and recommend action to be taken with regard to contacting and obtaining approvals of interest owners. (6) Arrange for meetings with royalty owners association or representatives, if necessary or desirable. (7) Prepare testimony for hearing before regulatory agency, as applicable. (8) Furnish general land and lease advice to the steering committee. (9) Complete special projects, as requested.
VOTING:	Majority vote.
REPORTS TO:	Chairman of steering committee.

LAND SUBCOMMITTEE sign up all interested parties. Fig. 7.

tails of the agreement. They have, therefore, preferred to rely upon the representation of the land men who approach them rather than go to the expense of employing attorneys and experts of their own.

The composition and duties of the land subcommittee are shown in Fig. 7.

The engineering subcommittee

In most unitization efforts, the most time is consumed by the engineering subcommittee. This is because of the large amount of data that must be gathered, tabulated, and used in determining the economic feasibility of the project, and for use in establishing an equitable participation formula.

The engineering subcommittee is composed of one representative for each operator in the proposed unit area. As with the steering committee, it is desirable that well-qualified personnel be assigned to the engineering subcommittee.

Normally, the assignment of the engineering subcommittee will include a determination of the economic feasibility of the proposed unitization project. This is an extremely important consideration, and is frequently given insufficient study. Operators are sometimes carried away by calculations which indicate that large increases in ultimate recovery can be obtained by a unitized secondary-recovery or pressure-maintenance program, but a realistic determination of the added development and operating costs may show that the cost of obtaining this additional recovery would be prohibitive.

The organization and duties of the engineering subcommittee are indicated in Fig. 8.

ENGINEERING SUBCOMMITTEE

MEMBERSHIP:	One representive for each interested working-interest owner.
CHAIRMAN:	Elected by members. Term indefinite.
DUTIES:	(1) Preparation of engineering reports, economic studies, and tabulations of data requested by the steering committee.
	(2) Preparation of an accurate base map, if required.
	(3) Timely reporting to the steering committee regarding status of work in progress, or new work necessary.
	(4) Attendance of chairman at meetings of the steering committee, when requested.
	(5) Supply copy of minutes to the chairman of the steering committee.
	(6) Preparation and presentation of engineering data and exhibits in hearing on unitization application, before state regulatory body.
	(7) Establishment of such engineering work groups as are required in furtherance of assignment.
	(8) Carrying out of special projects, as requested by steering committee from time to time.
	(9) Coordination with the geological subcommittee in a recommendation of a unit boundary.
	(10) Coordination with other subcommittees, as necessary.
VOTING:	Basis for determining value of each representative's vote, and required percentage to carry a proposal, to be determined by agreement. Details, if any, of negative or pass votes to be supplied in minutes.
REPORT TO:	Steering committee chairman.

ENGINEERING SUBCOMMITTEE gathers data on all phases. Fig. 8.

Other subcommittees

In large and complex unitization efforts, it may be desirable to establish subcommittees in addition to those already discussed. For example, if the proposed project involves gas recycling, a plant subcommittee may be formed. If the field is extremely large, efforts may be directed toward the simultaneous formation of several contiguous units, with each unit being operated by a different company. In such a case, it probably will be necessary to establish a coordinating subcommittee. Other subcommittees may be formed to carry on single, specialized tasks.

The plant subcommittee . . . If a gas-products plant is already in operation in the field being unitized, the plant subcommittee may be charged by the steering committee with determining an equitable basis for the evaluation of the plant and its inclusion in the unit as a unit facility. This assumes, of course, that the owner or owners of the plant are agreeable to a transfer of the plant to the unit.

If there is no plant in the field, the plant subcommittee may be charged with determining the capacity of the plant required, the approximate cost of the plant, and the economics involved in its construction and operation. The subcommittee, in preparing its analysis of the plant, also may determine the availability of makeup gas from other sources, and the cost of such gas.

The coordinating subcommittee . . . The simultaneous formation of contiguous units poses many problems. For example, there is the matter of establishing the boundary line between units. Each operator naturally would prefer that all or most of its holdings be in one unit. Likewise, it is desirable that a lessor's interest not be split between two units. Yet, these ideals are not always attainable. Further, it is desirable that coordination of operations, once the units become effective, take place. The general approach to the matter of determining equities should be uniform, to avoid resistance on the part of royalty owners and operators who believe that the method adopted by an adjacent unit would be more favorable to them. Economies of operation often can be realized by the joint ownership by adjacent units of certain facilities such

as a water supply and distribution system or a gas-products plant.

Coordination is needed among the various groups working on the unitization. Such coordination is the responsibility of the coordinating subcommittee. In performing its functions, it will perform liaison among the various engineering, geological, legal, and land subcommittee, and between these subcommittees and the steering committee. Many differences of opinion and problems can be resolved by the coordinating subcommittee, without reference to the steering committee, thus leaving to the steering committee the establishment of broad policies and directives, and approval of completed work assignments.

The civil-engineering subcommittee... Although the engineering subcommittee is often given the task of preparing a base map of the field being unitized, in very large units or where well locations or property lines are known to be inaccurately plotted, a civil-engineering subcommittee may be formed and charged with the preparation of an accurate base map. This subcommittee will accumulate data and information relating to the preparation of a base map of the area designated by the steering committee, and will present cost figures and recommendations to the steering committee.

The participation formula

The formula for the apportionment and allocation of the unit production is the core of the unitization agreement. It is the most difficult problem to solve, but unitization is impossible until it is agreed upon by the operators and accepted by a substantial majority of the other working-interest owners and royalty owners. The participation formula determines the portion of the unitized oil and gas each interest owner is to receive, and also furnishes the basis for the allocation of costs and expenses for the development and operation of the unitized area.

The formula usually is agreed upon only after lengthy negotiations. The ideal formula would provide for each tract in the unit a share in the unit production that is in exact proportion to its contribution to the unit. But with the reservoir being thousands of feet beneath the surface, and data often being incomplete, the value of each tract is not susceptible of exact measurement. Thus, we have a situation where opinions are apt to differ. Reconciling these differences is the problem. T. Murray Robinson, Oklahoma City attorney, has written, "No unit can be formed unless each operator is prepared to make concessions. I doubt that a unit has ever been formed where all of the operators thought that all of the unit provisions gave them a full, fair share of the unit production, and adequately protected their interests." R. M. Williams of the legal department of Phillips Petroleum Co., characterizes the negotiation of unit agreement as "the process of reconciling selfish viewpoints. . . ."

Companies and personnel experienced in unitization feel that the negotiation of a formula is a matter of give and take, and that although a particular formula may be slightly to their disadvantage, the over-all benefits are such that a sacrifice is worth taking.

Formula requirements . . . Basically, the participation formula must be one which will be approved by a substantial majority of the owners of interests in the reservoir proposed for unitization, and, if applicable, by the state regulatory agency.

The statutory requirements of various states provide sign posts and stop lights for those negotiating the formula. These may be disregarded only at the risk of losing the ultimate approval of the regulatory agency. It is here that the attorneys working on the formation of the unit can perform a most valuable service—that of keeping those negotiating a formula within the applicable statutes. The Oklahoma, Nevada, and Alaska enactments require that the participation formula provide for each separately owned tract its "fair, equitable, and reasonable share" of the unit production. The Arkansas law insists that the formula provide a "fair share" of the oil and gas, based upon the relative contribution made by each tract to the unit operation.

It is of paramount importance, then, that the operators, when they have agreed on a participation formula, ask themselves these questions before proceeding further:

1. Does the formula give each tract its fair, reasonable, and equitable share of the unit production?
2. Will the formula be accepted by a substantial majority of the working-interest and royalty-interest owners?
3. Can the formula be successfully defended, in the event there is opposition by some interest owners at the hearing before the regulatory agency?

If all the foregoing questions can be answered in the affirmative, a successful completion of the project is indicated.

Factors in the formula . . . Factors commonly considered and used in the participation formula include the following:

1. Productive acre-feet.
2. Productive acreage.
3. Estimated oil and gas in place.
4. Estimated reserves recoverable.
5. Cumulative production.
6. Number of wells.
7. Current production.
8. Bottom-hole pressure.
9. Current and potential income.

The formula finally agreed upon may be based upon any one or a combination of two or more of these various factors. If two or more of these factors are used, they may be combined with equal or unequal weights to each factor.

The engineering subcommittee will be assigned the task of accumulating the required data and making the necessary studies so that the value of each factor for each tract may be tabulated. It should not be assumed, however, that all of the factors listed above can be determined for each area proposed for unitization. In older fields, especially, such factors as productive acre-feet and reserves often are not susceptible of even fairly ac-

"Companies and personnel experienced in unitization feel that the negotiation of a formula is a matter of give and take, and . . . the over-all benefits are such that a sacrifice is worth taking."

curate determination, because of the lack of well logs and other essential reservoir data.

It was pointed out earlier that one of the basic requirements of a successful unit agreement is that each tract should share in unit production in proportion to its contribution to the ultimate income of the unit.

It is emphasized that a tract can contribute to ultimate unit recovery without itself producing a barrel of oil or a cubic foot of gas, as would be the case where a well on a single-well tract is converted to a gas or water-injection well, or where gas wells or high-gas-oil-ratio wells are shut in to conserve reservoir energy. Such a determination of contributed value assumes that sufficient data are available for use in making the necessary estimates with a reasonable degree of accuracy.

Included will be an estimate of the remaining reserves in place, an estimate of the portion of these reserves that will be recovered under unitized operation, and a proposed plan or procedure for producing these reserves. This determination, however, requires complete and reliable data, and an agreement among the engineers as to the interpretation of these data.

"Closely related to the recoverable-reserves factor is the factor of net or productive acre-feet underlying each tract."

Closely related to the recoverable-reserves factor is the factor of net or productive acre-feet underlying each tract. In the fields developed in more recent times, most of the operators obtained cores or formation samples, electric logs, and drill-stem test data on their wells during the drilling and completion phase. With these data, it is not difficult to determine and agree upon the productive acre-feet of the reservoir underlying each tract. Such a determination usually can be assumed to provide an equitable and reasonable basis for sharing in unit production. The acceptability of this factor by interest owners and regulatory agencies is pointed out in a paper presented by E. B. Miller, Jr., Tidewater Oil Co., before the API in Fort Worth, on May 4, 1953. Miller's compilation of participation formulas for some 132 units showed that in over 50% of these, acre-feet of pay was used as the factor for participation. Based on personal experience with many unitization efforts, it is believed that productive acre-feet is used either singly or in combination with other factors in perhaps 75% or more of modern-day units.

In older fields, use of the factors of wells, current production, and cumulative production, singly or in combination, is quite common. Use of a well factor is logical, since it is a measure of the operator's investment and of his contribution to the unit plan of development. Cumulative production is an indication of the extent of the pay zone underlying each tract and thus of future income, and current production is indicative of both present and future income.

Any factor or combination of factors will serve as a basis for participation in a unit provided that the resulting formula will distribute to the various tracts in the field a fair share of the oil which will be produced following unitization.

Negotiating the formula

The responsibility for the negotiation of the formula constitutes a matter upon which all unitization personnel do not agree. Some believe that the engineering subcommittee should be charged by the steering committee with the recommendation of a fair and equitable participation formula. Others believe that the engineering subcommittee should be given the assignment only of tabulating the value of the various possible factors as they pertain to each tract, leaving to the steering committee the negotiation of the formula. The latter procedure, admittedly, contemplates a formula based on the participation each operator will agree to accept.

It should be noted that it is the individual tract rather than the individual operator that should be given primary consideration. The inherent danger involved in arriving at a participation formula as a result of negotiations by the steering committee lies in the possibility that this committee may be inclined to look more at the over-all picture, to the exclusion of consideration of the individual tract. In other words, members of the steering committee may think more in terms of the total percentage a certain formula will give their respective companies; but, while the total percentage may be acceptable, there could be gross inequities insofar as certain individual tracts are concerned.

All personnel must constantly keep in mind that the operators are only one of the parties to a unitization agreement. The royalty owners of the individual tracts constitute the other party, and they, too, must give their approval.

The engineering subcommittee should probably be made responsible for recommending the participation formula, with the steering committee having the power to accept the recommended formula, or, with good reason, to reject or modify it.

Initial adjustment of investment

Upon the effective date of unitization, the operators in the unit area contribute to the unit their wells which are producing from the unitized zone, the equipment in these wells, and such surface equipment as is needed by the unit in its operations. Such equipment normally includes casing, tubing, rods, and other subsurface equipment, and wellhead connections, pumping units, tanks, tank batteries, flow lines, water lines, gas lines, and other surface equipment.

It is obvious that the investment of each operator in wells and equipment is not necessarily proportional to his percentage share in the unit, because of differences in the extent of development of the properties and variations in the amount and type of equipment used in producing the wells. Thus, it is entirely equitable that each operator be given credit for any excess contributions he makes, or charged for the amount his contributions are less than his proportionate share. This adjustment cannot be made in the participation formula, because of the inequities to royalty owners that would result. The adjustment of investment is strictly among operators. The provisions for the adjustment are negotiated by the operators and are included in the operating agreement.

In states having compulsory-unitization statutes, these statutes fix in general terms the procedure and basis for such an initial adjustment.

There are cases where there will be no need for an adjustment of investment. This is apt to be so where the field is old and fully developed,

and the initial contributions of the operators are substantially in balance. Also, where a field is fully developed, it can be argued that each tract should contribute equipment sufficient to produce it, even though some parties may be considerably overcontributed. Normally, however, an initial adjustment of investment will be provided for in the agreement.

Intangible investment . . . Intangible drilling and development costs include such items as the cost of drilling, cementing, logging, drill-stem testing, supervision, labor, and administrative overhead. These costs vary with the individual well and the individual operator, and if the contribution of wells by each operator is substantially in balance with his unit participation, these intangible costs should not be included in the adjustment of investment. Also, these intangible costs in the usual case have been deducted as expense in the income-tax returns of the operators, and a reimbursement for them would constitute income.

There are unitization projects where, however, an adjustment for intangible investment appears to be entirely proper and desirable, in the interest of preserving equity. Such would be the case where certain of the tracts being included in the unit are either undeveloped or incompletely developed on the established drilling and spacing pattern. Since it obviously would be inequitable to permit operators to bring their undeveloped or incompletely developed tracts into the unit without compensating those operators who have invested money to completely develop their tracts, an adjustment for intangible investment is in order.

One method of making an adjustment for intangible investment would be to determine the average intangible costs per well for all the wells in the field, and charge each operator this sum for each undeveloped tract he contributes to the unit.

Another method that appears to be equitable involves the application of an average charge or credit based on the number of feet of net effective pay underlying each tract.

Tangible investment . . . Tangible development costs include the costs for such items as casing, tubing, sucker rods and other subsurface equipment, and wellhead equipment, pumping units, tanks, tank batteries, derricks, flow lines, and separators.

Adjustment for the tangible equipment, with the exception of casing, has become so standard as to constitute no problem and no particular difference of opinion as among operators. The only matter which might constitute a source of argument is the valuation to be placed on equipment. Some operators believe that equipment should be valued in strict accordance with "PASO - T - 1955 - 2 Form Accounting Procedure," the use of which is standard for most units. Section 3, Paragraph 2 of this accounting procedure provides that material which is taken over and is in sound and serviceable condition, and is suitable for reuse without reconditioning, shall be classed as condition B and priced at 75% of new price.

Paragraph 2 goes on to provide that material which cannot be classed as condition B but which after reconditioning will be further serviceable for original function as good secondhand material (condition B), or is serviceable for original function but substantially not suitable for reconditioning, shall be classed as condition C, and priced 50% of new price.

In the matter of adjustment of investment for casing, the operators appear to be pretty well divided. One group favors adjusting for casing in the well, at least for the oil string. The other group believes that no adjustment should be made for casing, except in those cases where the area being unitized is incompletely developed.

The first group contends that casing in the ground is just as much a part of the tangible investment as is equipment above the ground. The second group, while agreeing that casing is a part of the tangible investment, contends that most of the casing, being cemented in the hole, is not recoverable, and further, that it cannot be inspected and its true condition and value ascertained.

The unitization agreement

The unitization agreement is, to a major extent, a creature of experience. Its general form has been developed through the years as problems have arisen and operators and their attorneys have found methods and wording to solve them. Unit agreements are not yet perfect, but they are constantly being improved.

All attorneys have their own individual manner of expression, and most take a pride in authorship. In the matter of unitization agreements, however, the attorney who prepares such an agreement "from scratch" is indeed walking on thin ice. Normally, much time, discussion, and rewriting can be avoided if the attorney or attorneys who draft the agreement will review recent agreements that have been adopted, and use them as a guide.

Form of the agreement . . . Though the term "agreement" has been used throughout in the singular, it should be understood that the agreement may consist of one, two, or even three separate instruments. In the early units one instrument was used both as an operators' agreement and a royalty owners' agreement, and such a single instrument is generally still used in those states having compulsory-unitization statutes. The Arkansas and Oklahoma statutes, for example, require a finding by the regulatory agency that the agreement contains provisions for the creation of an operating committee, for the allocation of costs and expenses, and for the adjustment of investment. These items affect only the operators, but since they must be approved by the regulatory body, along with the provisions that affect the royalty owners, they are included in a single agreement.

In states where voluntary units are authorized, the regulatory agency usually does not control the matters which affect only the operators; thus, it has become the general practice in these states to prepare a unitization, or royalty owners' agreement and a unit operating or operators' agreement. Only the royalty owners' agreement

"In the early units, one instrument was used both as an operator's agreement and a royalty-owners' agreement, and such a single instrument is generally still used in those states having compulsory-unitization laws."

is presented at the hearing. By eliminating from the royalty owners' agreement all material affecting only the operators, the instrument is shortened considerably and is less confusing to the royalty owners.

There is no standard form of unit agreement, or unit plan of operation, as it is sometimes called, which is applicable to all units and to all jurisdictions. However, there are a number of standard clauses and provisions in agreements which are in common usage in the various geographical areas, and there are formal clauses prescribed in each of the various jurisdictions.

In 1955, following 2 years of effort, an API subcommittee composed of experienced engineers, attorneys, and other personnel dealing with unitization matters in this country, developed model forms for a unitization agreement and for a unit operating agreement. The acceptance of these model forms by the industry has been excellent, and they have been used for voluntary unitization projects in Texas, Colorado, Louisiana, Mississippi, and several other states, usually with no appreciable change in wording. Most certainly, operators working on the formation of a voluntary unit should consider use of the API model forms, if only as a guide or check list.

Drafting the agreement . . . The task of reducing to writing the unit plan of operation from a mass of pencil notes, minutes of meeting, and oral discussions is given to the legal subcommittee. This subcommittee is committed to following the outlines and specific agreements reached by the steering committee, and to casting the plan and its procedure into language which complies with the statutory and administrative requirements of the jurisdiction.

While much of the unitization agreement consists of standard clauses and provisions, the agreement cannot be completed until the operators are agreed on such important provisions as the participation formula, the basis for adjustments of investment, voting procedure, and other matters that must be decided by negotiation. Thus, the attorneys should not be told to prepare the initial draft of the agreements until these matters are settled. Reviewing drafts without these important provisions would be meaningless.

Experience has shown that it is more effective to have one attorney, preferably the chairman of the legal subcommittee, prepare the initial draft of the agreement. This attorney, after the provisions of the proposed project are agreed upon, should carefully prepare the agreement and circulate it to the interested departments within his own company for review and concurrence, before transmitting it to the other members of the legal subcommittee for their review. After the members of the legal subcommittee have had ample time to review this draft, a meeting of the subcommittee should be held, at which time the draft will be put in shape for submission to all the operators.

"Following a review by the operators, a meeting of the steering committee should be held to discuss and agree upon suggested changes. The agreement should then be referred back to a small legal work group which will perform such redrafting as is required."

Following a review by the operators, a meeting of the steering committee should be held to discuss and agree upon suggested changes. The agreement should then be referred back to a small legal work group which will perform such redrafting as is required.

It has been found to be extremely helpful, in the preparation of drafts, for one or two technical or operational personnel who are intimately familiar with the details of the proposed unitization to work closely with the attorneys and explain technical details and operational problems.

Review of agreement . . . Unnecessary delays in the completion of unitization projects are sometimes caused by an inadequate review by one or more operators of the unitization agreement while it is in the draft stage. There have been cases where a company or individual operator waits until the agreement has been approved by all the other operators, placed in its final form, and submitted to it for execution, before submitting it to their lawyers and other interested departments for approval. And, in such cases, these attorneys and other departments may find provisions or language incorporated therein which they feel places their company in an untenable position. Thus, negotiations may have to be reopened, and perhaps changes made in the agreements, often resulting in lengthy delays, or even failure of the unitization effort.

Each operator should have an established procedure for reviewing agreements. All agreements can be expected to contain provisions dealing with lease, accounting, insurance, legal, engineering, tax, and operational matters. Thus, it is only reasonable that the departments within a company that specialize in these matters should be called on to review, propose changes and additions, or approve each draft of the agreement that is received.

The typical review cycle could be as follows. The chairman of the legal subcommittee, after the provisions of the agreement are agreed upon by this subcommittee, has it reproduced in draft form, in the required number of copies. These are then given to the chairman of the steering committee, who will transmit them to the individual members of the steering committee in the number of copies previously requested. Each member of the steering committee, upon receipt of these copies, will route them through the various interested departments of his company with a request for comments or concurrence. Each steering-committee member should himself review the agreement and be intimately familiar with the contents thereof.

Upon receipt of the comments from the various departments, the steering-committee representative should review the comments, and he may consult further with these other departments. At the time the chairman of the steering committee transmitted the drafts to the members, he probably will have included a notice of a meeting of the steering committee for the purpose of discussing the agreement and making such changes as are agreed upon. The chairman, in calling the meeting, must allow ample time for the different companies to review the agreement before the meeting.

At this point, a plea should be made in the interest of expediting this one part of the unitization process. If the language used clearly states the intent of the parties, it should be acceptable to all, even though every individual, given a choice, might have worded it differently.

The execution copy . . . If the drafts of the agreement have been carefully reviewed, and all provisions and changes agreed to, there is no particular problem in regard to preparation of the execution copies.

The execution copies should be legibly printed, attractively bound, and printed in sufficient copies for distribution to all interested owners.

Interest-owners' approval

By the time the unitization agreement is put in final form for execution, all, or a substantial majority of the operators, will have expressed their satisfaction and intent to execute the agreement. It must be remembered that even one operator with a strategically located lease, unless he can be forced into the unit under compulsory-unitization statute, can sometimes make unitized operations impossible, or at least unattractive. It is up to the steering committee to decide if enough operators are committed to proceed with the preparation of the unit agreement in final form, and submission of the agreement to the various interest owners for execution.

Determination of ownership . . . Before the owners of interests in the area proposed for unitization can be contacted and their approval of the agreement requested, it is necessary to determine just who these owners are and where they are located. This may be a simple task, as in some proposed units the owners are few in number. In other units, the compilation of the ownership lists may be a major undertaking, such as was the case in the Oklahoma City South Wilcox unit. In this unit there were only four operators involved, but there were approximately 4,700 royalty owners under this 2,000-acre unit.

There are two general methods used in obtaining the names of the interest owners under each of the various tracts. One method is for the chairman of the land subcommittee, or for whatever person or group charged with the task of compiling ownership lists, to request that each operator furnish a current list of owners under the tract or tracts he operates. A second method is for these lists to be requested from the pipeline purchaser or the company disbursing the proceeds from the sale of the oil from the properties.

As a general rule, the second procedure is preferable, since one can be fairly certain that the party who disburses the proceeds has the more current list of owners and their addresses. Another advantage to this second method is that while there may be many operators in a field, perhaps as many as 30 or 40, generally there are relatively few pipeline purchasers or companies disbursing the proceeds.

These companies disbursing the proceeds usually have such ownerships set up on machine record cards, and can quickly furnish a current list showing name, mailing address, per cent interest, and type interest. That the ownership lists be complete and correct is important, as a means of saving time in contacting the various owners, and to avoid possible litigation in event any owners inadvertently are not contacted.

But in Oklahoma, in unitization hearings before the Corporation Commission, it is absolutely essential that the witness testifying as to the owners signed be able to testify as to the correctness of the ownership determination. The commission is willing to accept a determination based on a title search or signed division orders.

Instances are known where ownership lists were requested too early in the unitization effort, with the result that by the time the operators were ready to contact the interest owners for their approval of the unit agreements, many changes in ownership or addresses had occurred, necessitating revision of the lists. Preparation of royalty - ownership lists, if properly planned and executed, normally is not a lengthy task, and thus can be delayed until all of the controversial provisions of the agreement are resolved by the operators.

Securing approval or working-interest owners . . . If all operators have taken a part in the unitization negotiations, have been kept informed of all proceedings of the steering committee and the various subcommittees, and have been provided copies of drafts of the agreement for their review and comments, there should be no special problem involved in securing an execution of the agreements by these operators.

If only a few operators are involved, the agreement may be hand-carried by a representative of the unit operator to the other operators for their execution of the same copy of the agreement. Or the agreements may be transmitted by mail to each operator in turn for execution of the same copy of the agreement. Since the standard procedure seems to be for each operator to circulate even the execution copy through all its interested departments for final review and approval, the more customary procedure is for each operator to be furnished counterpart copies of the agreement for execution. It has been found that furnishing each operator several copies of the agreement will expedite its review.

Securing approval of royalty owners . . . There are several schools of thought as to the best procedure to follow in obtaining royalty-owner approval of the unitization agreement. These may be categorized as, (a) the encouragement of the royalty owner to form an association or committee of royalty owners, to employ legal advice, to hire professional engineering consultants, and in general to participate in all committees making preliminary studies; (b) to exclude the royalty owner from all participation and knowledge until the operators have arrived at a workable unit agreement; (c) to approach the royalty owner from the situation of an application for an order approving the agreement, with its customary limited time for notice before the actual hearing; and (d) for the operators to execute the agreement and then make a sales proposition out of getting the royalty owners to agree.

Both R. M. Williams and T. M. Robinson, attorneys dealing in unitization matters, in their writings on this subject, advise as to the value of the early inclusion of the royalty owner in the unitization proceedings, both as to the effect it has upon the unit and its future course, and as a preventive measure against uninformed legislative assaults in the future. Experience appears to indicate that the major difficulty with royalty owners is that of the uninformed owner.

No hard and fast rule can be made as to the best procedure to be followed in acquainting royalty owners with the proposed unitization. The proper procedure would appear to depend to a great extent on several factors, such as the number of royalty owners involved, their location, their probable attitude toward unitization as demonstrated in other unitization projects in the area, their present income from the area, depending on whether the field is in the "flush" or "stripper" stage, and others.

Most certainly, if the royalty owner has been notified or has learned in some manner about the proposed project and has requested that he be included in the negotiations, he should be made welcome at the committee table early in the negotiations and should be kept informed of all the problems to be resolved before the unitization can be effected.

It would appear that the approach to be used in securing royalty-owner approval involves an important decision, properly a matter for recommendation by the land subcommittee and for decision by the steering committee.

In many of the fields or areas in the Southwest, royalty-owners associations have been formed for the pur-

pose of protecting the royalty owners in matters involving their lands and interests. These groups often retain the services of qualified legal counsel, petroleum engineers, and geologists, and quite often have considerable influence. If such an association exists in the area being proposed for unitization, approval and support of the proposed unit by this group is essential. Thus, it is desirable to arrange a meeting with the association or its board of directors before the agreement is presented or sent to the royalty owners for approval. At this meeting, the operators should have a member of management, an engineer, a geologist, an attorney, and a land man present to present the unitization proposal to the members of the association. Here the utmost in diplomacy, sincerity, frankness, and fairness must be displayed by the operators' representatives.

When the time arrives for submission of the unit agreement to the royalty owners for approval, the presentation can be made either by mail, personal contact, or both. It may be decided to make the initial contacts by mail, and then personally contact those owners who voice objections, ask for additional information, or do not reply. Since the royalty ownership may be pretty well spread out over the country, the economy of contacts by mail is evident. In the states having compulsory unitization, it often is possible to secure the required percentage of approvals without a single "in person" contact. But in other units, even in compulsory-unitization states, if there is some opposition by royalty owners, it may be necessary to personally contact almost every owner.

If personal contacts are made, it is essential that those representatives of the operators making the contacts be thoroughly familiar with the proposed project, and be able to answer the many questions which will be asked. The royalty owners will want to know how participation was determined, what effect the unitization will have on their current income, how to figure their share in unit production, what their ultimate income will be, how the unitization will affect their rights as royalty owners, what the unit plan of development will be, and many, many others. It has been found desirable, in many cases, to use centrally controlled and coordinated contact teams composed of a land man and an engineer.

All persons making royalty-owner contacts must be thoroughly briefed as a group before embarking on their mission, and they must be sure to give the same information to all owners. Quite frequently the information to be given the royalty owners will be approved ahead of time by the steering committee.

The regulatory agency

It is not within the scope of this article to discuss in detail the statutory authority for the formation of units in the various state jurisdictions. Many of the states have statutes which expressly permit unitized development, operation, and management. In other states there is no express authority for unitized operation of oil and gas fields. Those involved in the formation of a unit must, of course, be familiar with all applicable statutes, if any, in the particular state in which the proposed unit is located, and guide themselves accordingly.

The general procedures to be followed only in states requiring a formal hearing before the regulatory agency will be covered.

Preparing for the hearing . . . If the statute or regulations require that a hearing be held before the unitization project can be approved, these same regulations or statutes will prescribe the conditions that must be met, before the project can become effective. The area to be included in the unit, the participation formula, the economics of the project, approvals by the interest owners, all must meet the requirements of the statutes.

It is in the preparation for the hearing that the attorney selected to represent the applicants before the regulatory agency has one of his most painstaking responsibilities. He will, of course, thoroughly review the applicable statutes and see that all requirements are met by the agreement. He must make certain that evidence, oral and visual through the use of exhibits, is available in sufficient quality to sustain an order of the regulatory agency based upon the testimony of the expert witness.

The course which applicants for the proposed unit, and their legal counsel, should take at the hearing is dictated by the nature of that proceeding. The hearing may be a routine matter of proof and presentation, or it may become surcharged with strong and bitter opposition. But whatever the character of the hearing, the unit proponents have an affirmative burden to carry in that they must present evidence which persuades and permits the regulatory agency to make the findings required by the particular enactment. Expert testimony is required.

Petition, application, or proposal . . . The first step in securing the approval of the regulatory agency essential to its order placing the unit and the unit plan of operation into being is the petition, application, or proposal for unitized operations. This pleading must follow the requirements of the statute of the state in which the unit is located. In general it contains: (1) a description of the unit area supported by a plat of that area showing the proposed unit outline; (2) a description of the oil and gas common source of supply; and (3) allegations required by statute. These will show: the means to be employed to supplement or maintain the reservoir energy; the reasonable necessity of unitized management, development, and operation in order to increase recovery; that the operation will prevent waste; that the added cost will not exceed the value of the additional oil and gas recovered; and that the unitized operation is for the general advantage and common good of the owners of the oil and gas rights in the unit area. The statutes generally require as exhibits to the application a map of the area, a copy of the unit agreement or plan of operation, and, in some states, a list by tract of the interest owners in the proposed unit area.

The notice . . . Notice of the hearing to be held to consider the petition must be given by publication, generally in one of the major newspapers in the state and in another newspaper in the area of the unit.

The hearing . . . This is held in accordance with the petition of the company interested in the formation of the unit. The rules of the regulatory agency concerned regulate the conduct of the hearing and the testimony acceptable to the agency.

The hearings are held before administrative boards or commissions, the members being chosen by election, serving ex-officio, or appointed with the consent of a legislative body. As a general rule the agency is intelligently informed through a staff presentation, if not by experience, of the matters involved in a hearing of this type.

In a typical hearing, the witnesses for the applicant that will appear before the regulatory agency or the examiner are a land man, a geologist, and a petroleum engineer. The first witness called is the land man who supervised the obtaining of the signa-

tures of operators and royalty owners. Through him will be established such facts as the ownership of the mineral interests in the field, and the percentages of working-interest and royalty-interest owners who have executed or ratified the unit agreement.

The geologist will testify as to the geological aspects of the field, such as its structure, the nature of the formation or formations being unitized, the limits of the field, the net-pay isopachous map, geological cross-sections of the field, and that the area covered by the unit agreement contains only such part of the field as has reasonably been defined and proved productive by development.

The petroleum engineer will present a brief history of the reservoir, will testify as to certain reservoir data, and will estimate the ultimate primary recovery under present methods of operation and the ultimate recovery under a unitized program. He will present in general terms the unit plan of operation and the cost thereof, and will show that the added costs of unit operation will not exceed the value of the estimated additional oil that will be recovered. He will testify as to the need for unitized operations to increase the ultimate recovery, prevent waste, and promote the conservation of oil and gas.

One of the most important reponsibilities of the petroleum-engineering witness is that of giving a complete and detailed explanation of the participation formula, along with the engineering conclusion that the participation formula is fair, reasonable, and equitable to all owners in the field.

What has been outlined here is merely an indication of the material to be included and the procedures to be followed in a hearing upon an application for approval of a unit and the unit plan of operation. The amount and type and evidence to be presented varies, of course, with each jurisdiction. Failure to meet the requirements of the statutes can result in failure of the unitization effort.

Summary and conclusion

The basic problem of unitization is not that of selling the idea to the owners of interests in oil fields, since the advantages of such unitization have been proved. The problem, rather, is that of knowing how to carry out the process—how to initiate the effort, how to keep the effort rolling at a sure and steady pace, and how to conclude the effort. It would appear that the solution to the problem of successfully completing a unitization effort is often a matter of procedures.

The procedures suggested in this article are not new. Personnel engaged in unitization work have used them in the past and will use them in the future. Procedures other than those discussed have been used, some successfully — some unsuccessfully. No claim is made that the procedures which have been suggested here can or should be used in all unitization efforts. Every unitization effort is separate and distinct from every other unitization effort, with different fields, conditions, interests, and personalities involved.

It has been the purpose of this article to present a well-rounded discussion which may be used as a guide by those who may be confronted, perhaps for the first time, with unitization. While those who are not experienced in unitization work should benefit most from a study of the material contained herein, it is believed that those, also, who have participated in many unit negotiations may obtain from this writing certain ideas that will be of assistance to them.

The role of management in the unitization process is one of utmost importance. In the first place, management must be aware of and understand the processes involved. Management must give its endorsement to the unitization concept, and it must be willing to delegate responsibility and authority to those who represent the company in unitization negotiations. Management must keep open a two-way channel of communication between itself and unitization personnel. Finally, management should recognize the necessity of clear-cut, yet flexible policies on unitization matters.

In conclusion, it is desired to again emphasize that in order to bring a unitization effort to a successful conclusion, more than mere procedures is required. Procedures are an absolute necessity, but so, too, are cooperation, intelligent understanding, unselfishness, and a sincere desire to succeed.

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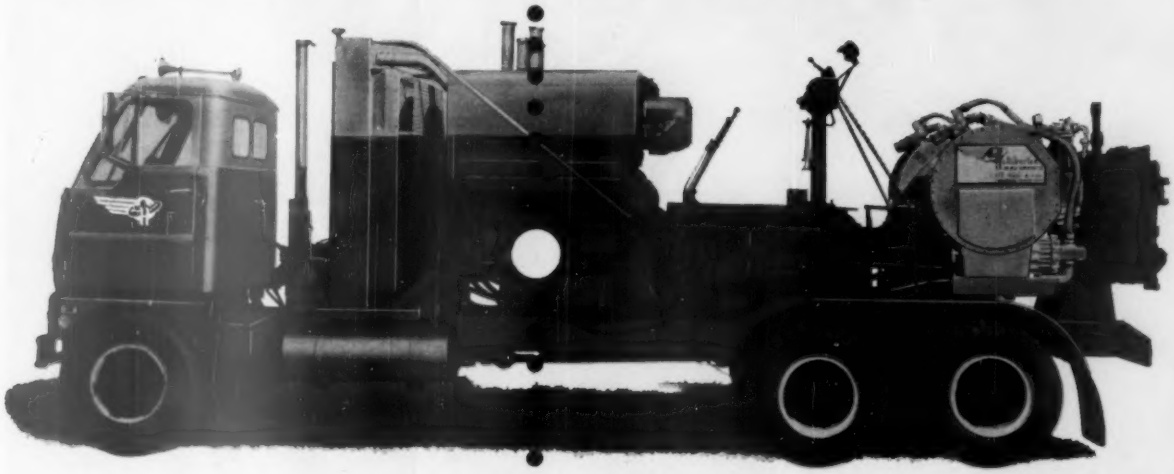

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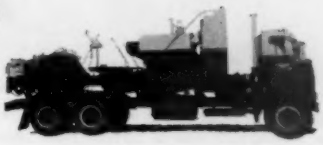

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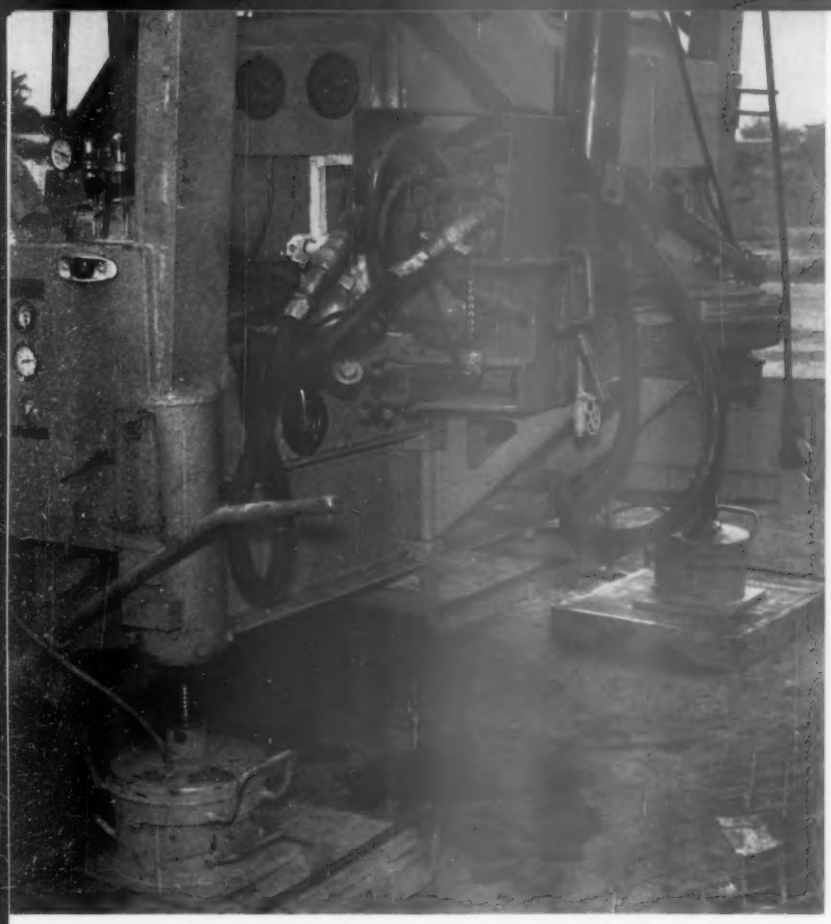


PRESSURE TRANSMITTING UNITS of the new weight indicator are shown in place under the legs of this portable derrick. Indicating gages are shown near the top of the photo.

GAGE can be placed in any position convenient to the operator.

New weight indicator gives hook load

Hydraulic unit operates under derrick legs, with indicator in full view of driller. Even wind load on the mast is shown. This indicator can be used on a single or double-pole mast or on a portable derrick.

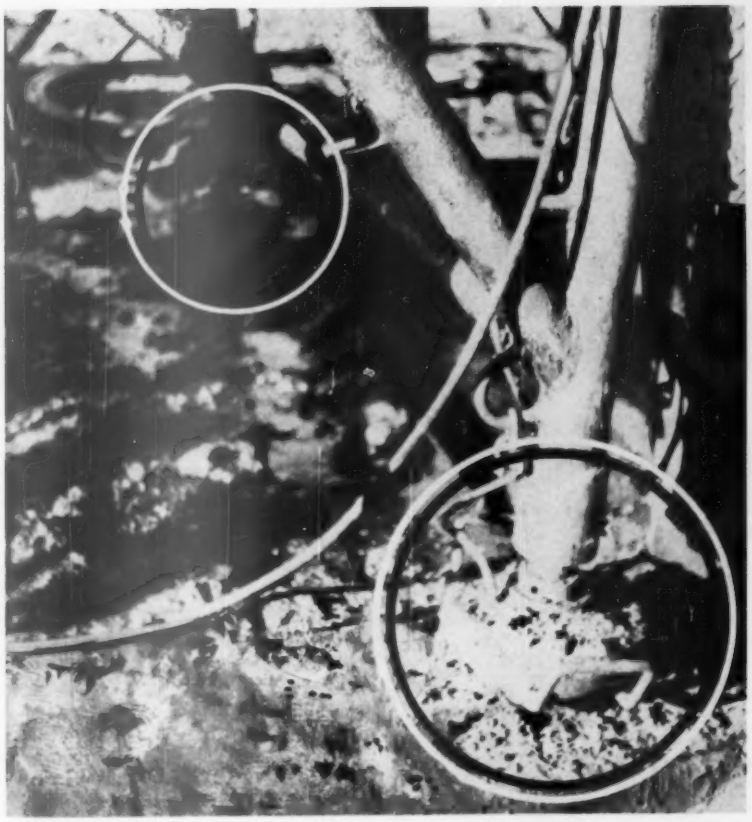
BY W. B. BLEAKLEY
Production Editor
AND ROBERT J. ENRIGHT
Dallas District Editor

HERE'S ALL YOU NEED to equip a portable derrick or a two-pole mast with this new indicator. For a single pole mast, only one hydraulic unit and one gage are required.

OPERATING on an entirely new principle, a new weight indicator has been designed to eliminate costly accidents caused by too much pull on a pulling unit.

Manufactured by Penant, Inc., and distributed by Bradford Motor Works, Tulsa, the "Safety Weigh" Indicator is simply constructed, and designed for use on either a single-pole servicing unit, a double-pole unit, or on a portable derrick. Any number of lines can be reeved in the derrick.

A simple hydraulic piston and cylinder is placed under the pole mast on the T-sill, replacing the conventional steel base plate. The pressure put on the fluid in the cylinder by the load on the mast is shown on a gage at the operator's position. The gage is calibrated in 1,000-lb. units of load on



SAFETY WEIGH INDICATOR installed on a Grant & Bennett Well Service Co. rig operating under muddy conditions near Purcell, Okla. Unit is capable of withstanding exposure to mud, oil, and adverse weather.

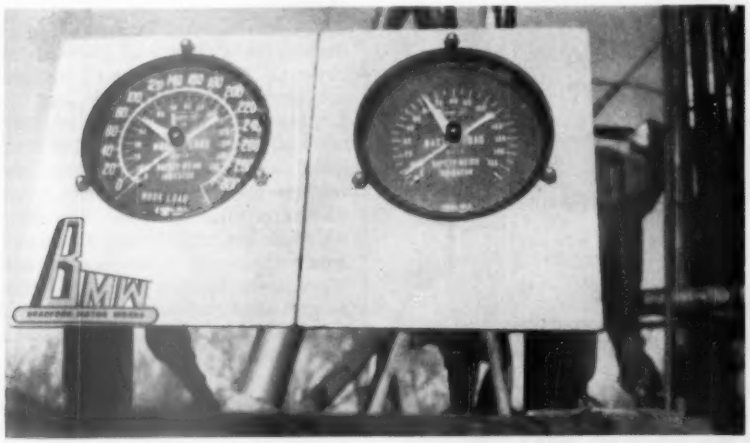
and total load on mast

the mast. The hydraulic cylinder is sealed with an O-ring, and has a maximum travel of only 1/32 in. under full load. The advantage of this is a minimum of wear, long life and low maintenance cost.

On double-pole masts and portable derricks a separate pad is used under each leg so that unequal loading can be detected and corrected, and two gages are used—one for each pad.

How it's rigged. On each gage there is a mast-load reference dial that is permanent, and an adjustable hook-load dial to correct for the preloaded, rigup weight. The installation of the instrument is not concerned with line string-up or line loads, and is therefore easy to install.

The receiving pad (the hydraulic cylinder) is placed on the T-sill. The mast is raised and the mast adjusting screw is screwed down until the weight of the mast with line and block load as well as part of the truck or trailer bed weight is shown on the mast-load dial. On single poles this will be between 5,000 and 6,000 lb.; on double poles and derricks it may be as much as 10,000 lb. on each pad. The guy lines are then hooked up and adjusted. The load on single-pole units may increase to 10,000 lb. for light units to 15,000 lb. on heavy pulling units. On double-pole units and derricks, the guy-line load may push the rigup mast load to 15,000 lb. on each pad.



OPERATOR'S VIEW of the weight indicator gages on the Grant & Bennett rig. These are connected by hydraulic hose to the piston and cylinder assembly shown in the photo at top of page.

How it works. After rigging up, with the mast load established, the hook-load dial is set to zero over the mast-load figure. This will be the reference point for all rigging conditions and corrects for further loads picked up by the hook.

In the interest of safety, on a single-pole mast, the rigup mast load should be observed at all times.

After the first heavy load is picked up to test the soundness of the rigging and foundation, the indicator should return to the zero reference point. If it falls below the zero mark, the foundation T-sill is settling; if it shows a sudden, sharp action while the pull is being made, a check should be made for a possible cracked sill. If the gage needle does not return to zero, but shows a load after the pull is made, a load guy line is moving at the clamps, at the stakes, or at the deadman.

In case the foundation is settling slightly, the adjusting screw can be tightened to return the mast load to the zero point.

Unequal readings of the dials on a double-pole mast or derrick show a settling of one corner of the T-sill. Recribbing should be done at once and the adjusting screw changed to balance the load on both poles. If a sudden variation occurs in the two gages while the pull is being made, the power should be shut off at once, for a T-sill has likely cracked or the earth's crust may have given way suddenly on one side.

On double poles or derricks, windloads will cause a variation in the readings of the two gages, and these can be watched to determine if the unbalance is approaching the limit of

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New Weight Indicator

safety. The stacking of tubing or rods on one side of the derrick will sometimes cause a hazardous, unsafe condition. This can be measured with this new tool, and corrected in time to avoid serious accidents.

Other features. Because this new weight indicator operates under the derrick legs instead of on the dead line, the load picked up by any line in the unit, swab line, sand line, etc., will be shown on the gages. No change in the rigup is necessary, and the hook-load dial need not be reset.

Mast structural loads are affected by various line stringups, and to read these, interchangeable dials are provided. It is only necessary to attach the proper dial for the line arrangement being used.

On cable-tool rigs, the action of the drilling tools can be seen in terms of gage readings instead of by "feel." The fluid level in the hole can be determined accurately with this instrument, and fishing operations are easily controlled.

Variations of rigging. Guy-line patterns vary from rig to rig, but in general fit a normal pattern. Most pole masts operate at an angle of 2° to 4° off vertical, and this affects the downward thrust of the guy-line load. This factor has been taken into account in the calibration of production-model dials for the indicating gages. Special hook-load dials are available to meet any condition of rig guy-line geometry, so that the exact hook-loads are obtained by direct reading.

Unsafe practice. While field testing the early models of the instrument, an unsafe practice in rigup was discovered that has probably caused some mast failures.

Bed-leveling legs are provided on some pulling units to stabilize the structure while the mast is being raised. These legs are designed for this purpose only, but some operators take advantage of these convenient jacks to provide a three-point support for heavy servicing operations. It was discovered that on some deep wells, 40% of the well load was actually being transfered through the mast hinge to the leveling legs. In an effort to provide a more stable rigup condition, the operator was actually setting the stage for a serious accident.

Operators enthusiastic. Well-servicing contractors that are using this new indicator are in agreement on its usefulness.

Grant & Bennett Well Service Co.,

New Weight Indicator

of Oklahoma City, has one of these new indicators on its servicing unit. "We feel that this indicator gives us an additional safety factor. We have quite a few rod jobs at 10,000 ft. and you have to pull about 35,000 lb. sometimes to unseat the pump. This instrument tells us just what the load is on the mast," said Walt Bennett.

L. E. Reames of Reames Drilling Co., Pawhuska, Okla., described the operation of the indicator during a recent storm. "There was 85,000 lb. on one leg and no load on the other." Precautions were taken to keep the mast from collapsing.

Wayne Clark, of Clark Well Service Co., Oklahoma City, says, "We like the remote-reading gage near the operator's station. It is also a safe feeling to know how the load is distributed on the two legs of the unit."

K. D. Emrick, of Seminole, Okla., operates six servicing units, but has the new instrument for only one unit. "It's easy to install the indicator, so we just move it from well to well, depending on how much of a load we expect to pull. We use it only when we think we might have to do a tough job."

One of the rigs on which the operation of the weight indicator was observed was a Grant & Bennett unit on location near Purcell, Okla. The pads under the legs of the portable derrick were hardly visible for the layers of oil and mud from recent rains. There was no apparent damage to the pads, and the indicators seemed to be functioning perfectly, despite the weather conditions.

Actuaries enthusiastic. One Dallas insurance-company executive, whose company writes about 40% of the industry coverage on light rigs, said that his company had 32 losses on masts in 1959 alone, that were attributable to overloading, or to unbalanced loading of the equipment.

These losses totaled more than $160,000, of which the insured, due to deductible clauses, paid about $21,000. The contractors' out-of-pocket losses averaged close to $650 per accident.

The 32 losses on the masts were, in all cases, caused by one of these three factors:

- Guy lines breaking.
- Deadmen pulling up.
- Foundation giving way.

This company's enthusiasm for the indicator lies in the fact that its analysis of these 32 accidents shows that they could have been prevented by use of this new tool. This enthusiasm is paying off to the contractors, too, in that insurance premiums have

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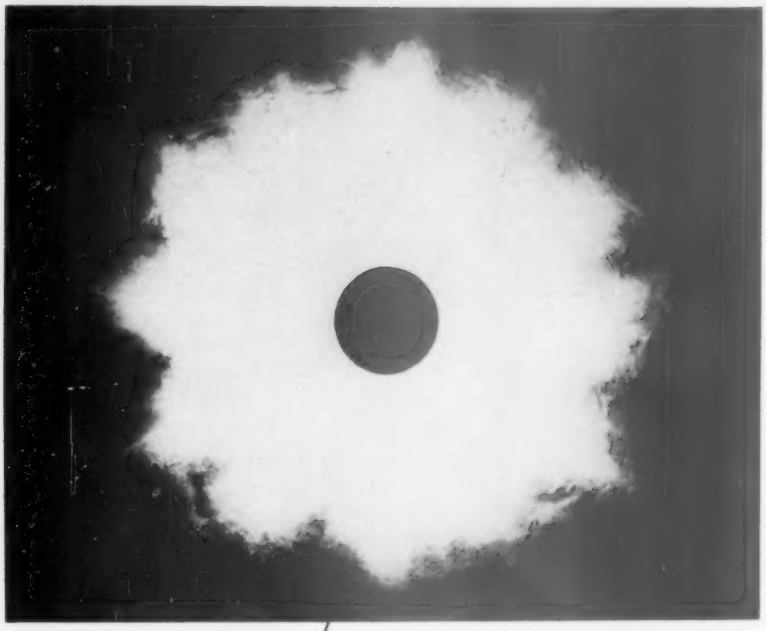

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WRITE FOR BULLETIN P-59

JOHN ZINK COMPANY

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New Weight Indicator

been decreased about 20% on rigs using the new equipment. There were 13 other rig accidents involving the insurance firm's clients due to other causes, beyond the control of any weighing device.

Case histories. From the files of this same insurance company come these case histories that illustrate what can happen if proper safety equipment is not installed on the rig, or if that equipment is not consulted regularly:

No. 1. A well-servicing contractor in South Louisiana, using a $60,000 servicing unit, was attempting to pull a packer. The packer proved stubborn, and a young operator decided to exert a little more pull on the tubing. The deadmen gave way, and the derrick pulled in. The equipment was well guyed, and in good mechanical condition. Loss—more than $21,000.

No. 2. A servicing unit on a well in the Oklahoma Panhandle had about 15,000 ft. of tubing set back in the derrick. The unit had four wind guys attached, and these were anchored to pipe stakes driven about 4 ft. into the ground. A light-velocity but gusty wind came up, and the unit was overturned, pulling up the guy-line stakes. In this case the deadmen were not adequate, but the weight of the tubing which was causing the overbalance could have been compensated for by taking up the proper guy. A weight indication on the derrick legs could have prevented this accident. Loss—about $36,000.

No. 3. A third preventable loss occurred on a well in the sandy-soil area of New Mexico. The service contractor had pulled 12,000 ft. of tubing and stacked it in the derrick. The derrick was of the guyless variety. The tubing weight caused the matting foundation under the derrick to settle, and the derrick toppled as the weight shifted. There had been no effort to determine if the unit was level after the tubing was racked. Loss—$16,000.

The insurance company's engineers feel that this weight indicator will prevent accidents of this type to the extent that they are offering a premium reduction, in some cases, where this tool is used.

The rate cut is an attempt to reduce the heavy losses that have been sustained on accidents of the type covered above. Claims for damages resulting from these rig accidents have comprised about 40% of the company's total losses in dollars from all of its rig insurance over the past 3 years.

The reduction in rate amounts to about 20%, and applies to rigs with masts in the $10,000 to $18,000 class.

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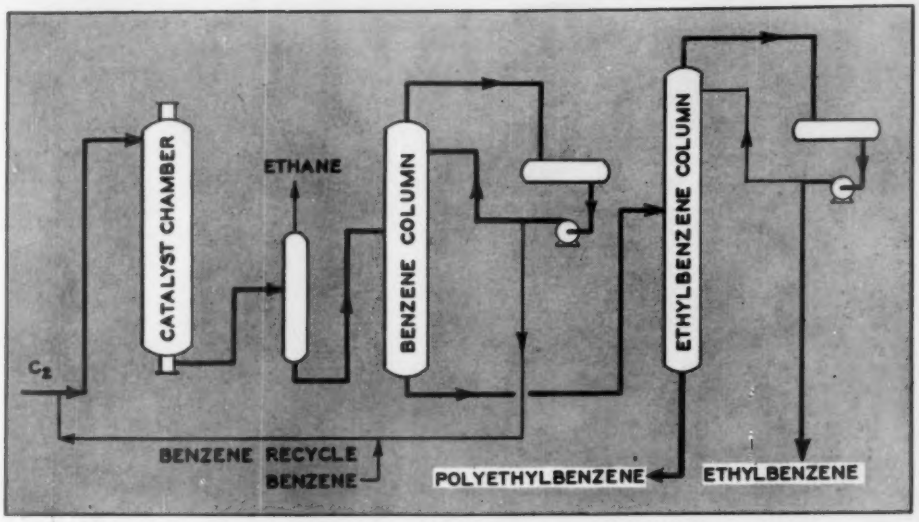


PROPANE decarbonizing unit at BP's Montreal refinery. Fig. 1.

BP's cat crackers get clean feed

Here's how metal contamination is combated in five plants

BY ROBERT J. HOOD
British American Oil Co., Ltd.
Toronto

TO THE REFINER, preparation of clean catalytic cracking is important. Metal contamination not only shortens catalyst life but it affects product distribution.

Several methods are used by British American Oil Co., Ltd., to produce these feed stocks. Not all of the gas oils produced are desirable from the standpoint of cleanliness.

Feed to our catalytic cracking units consists of one or more of the following: atmospheric or virgin gas oil, vacuum gas oil, decarbonized gas oil, and coker gas oil. We will review here the processes, gas-oil qualities, and operating conditions of the various feed-preparation units.

British American operates five fluid catalytic cracking units, consisting of one UOP unit, one Orthoflow Model A unit, two Orthoflow Model B units, and one Kellogg side-by-side unit. These are located at the Moose Jaw, Sask.; Edmonton, Alta.; Clarkson, Ont.; Port Moody, B. C.; and Montreal, Que., refineries, respectively. Throughput varies from 3,000 to 18,000 bbl. per day.

Table 1 shows a typical analysis of FCC-unit feeds.

Paper presented at the fifty-second annual meeting of AIChE, San Francisco.

Propane Decarbonizing

Designed charge of the propane decarbonizing unit at Montreal is 5,500 bbl. per day of reduced crude at a propane-to-oil ratio of 4:1. This unit is operated at or near capacity for maximum recovery of decarbonized oil.

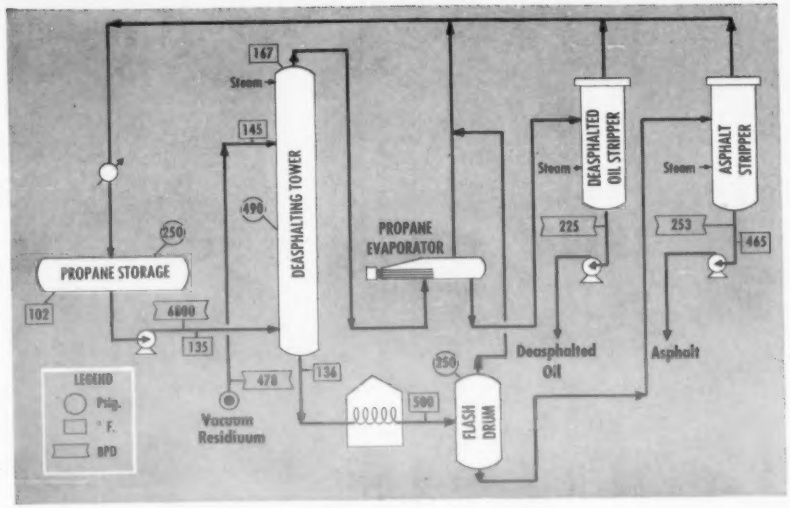
Yield and product properties for Kuwait crude runs are given in Table 2. Typical operating conditions are shown in the flow diagram (Fig. 1).

Reduced crude is charged near the top of the decarbonizing tower after cooling. Liquid propane, which acts as solvent for the oil in the reduced crude, is charged to the bottom of the decarbonizing tower. Propane flows countercurrent to the descending oil. Distributors and baffles mix the two streams.

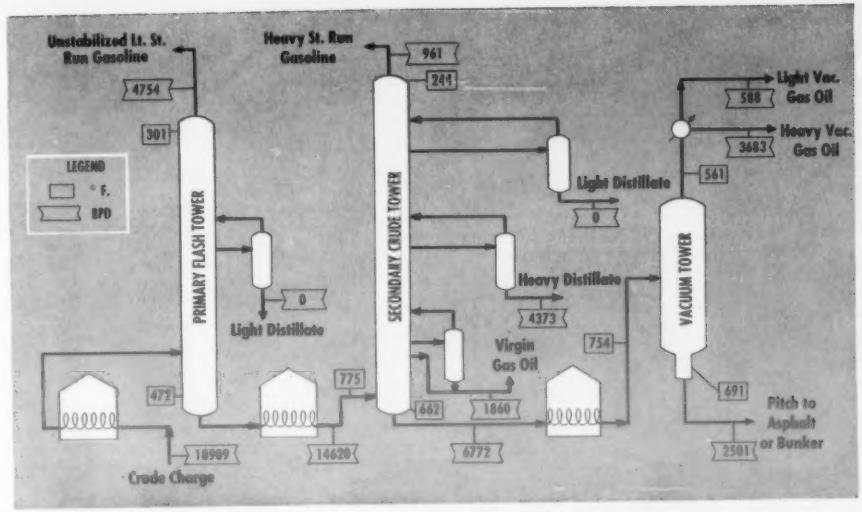
Heating coils in the upper section of the tower give the temperature drop

TABLE 1—FCC FEED ANALYSIS

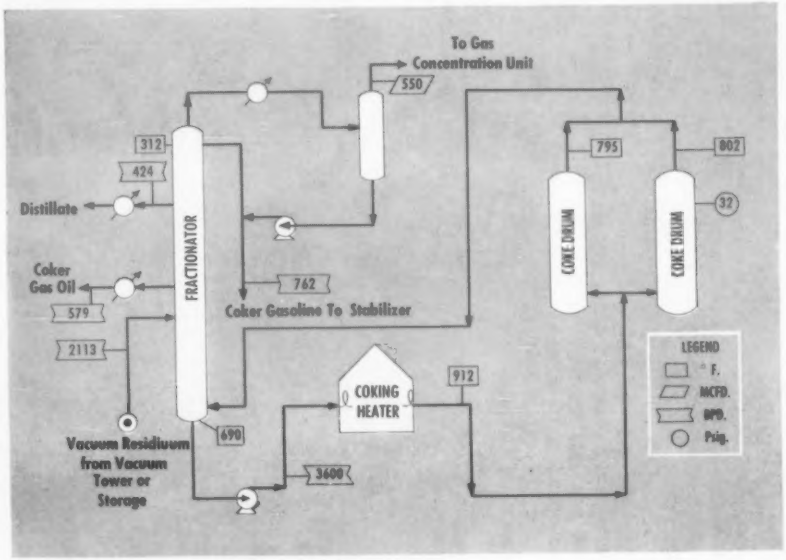
	Moose Jaw	Edmonton	Clarkson	Port Moody	Montreal
Gravity	29.7	30.8	26.8	27.8	24.5
Color Saybolt	8	8	.....	3.5	.....
Ramsbottom					
Carbon wt. %	.27	.12	.28	.14	.34
Sulfur wt. %	.50	.16	1.14	.....	2.35
Metals p.p.m.					
Iron	1.08	2.63	1.10	.63	.....
Nickel	.10	.87	.07	.01	.20
Vanadium	.03	.18	.03	.01	.62
Distillation	Vacuum	Vacuum	ASTM	ASTM	Vacuum
I.B.P.	420	485	360	542	475
10%	570	640	616	632	635
30%	680	695	.....	677	725
50%	750	740	.....	694	.....
70%	830	785	.....	.....	.....
90%	945	870	.....	.....	.....
F.B.P.	1,070	1,000	700	700	750
Recovery	99	99	40	64	40



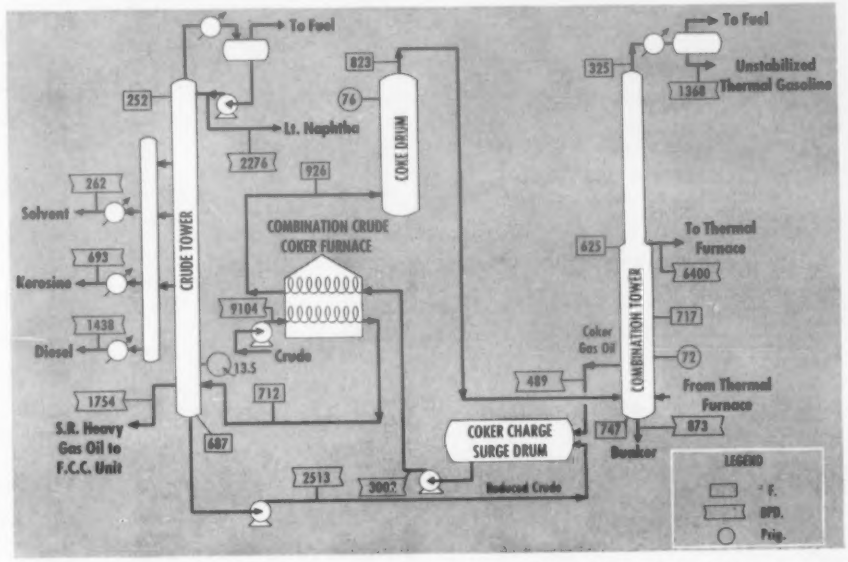
TYPICAL operating conditions on deasphalting unit at Clarkson, Ont., refinery. Fig. 2.



FLOW DIAGRAM for the topping and vacuum unit at Montreal. Fig. 3.



DELAYED-COKING UNIT at Moose Jaw refinery. Diagram gives typical operating conditions. Fig. 4.



COKING UNIT at Edmonton refinery is part of a combination unit that includes crude topping, thermal cracking, and delayed coking. Fig. 5.

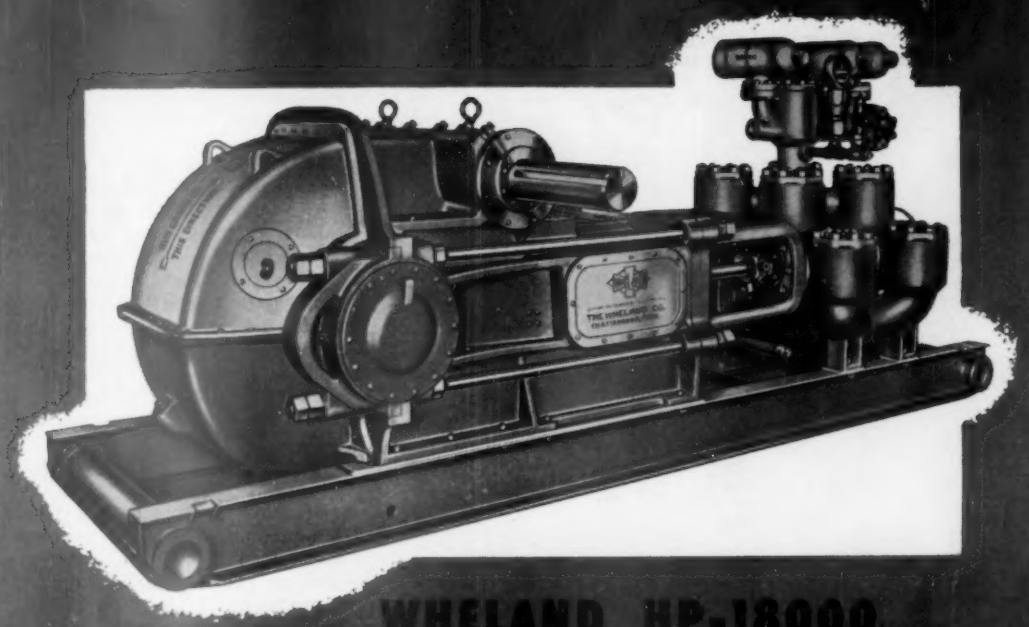


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TABLE 2—YIELD AND PRODUCT PROPERTIES, MONTREAL REFINERY TOPPING AND DECARBONIZING UNIT, CRUDE—KUWAIT (RUN—MAY 31, 1959)

Product	Raw crude	Heavy virgin gas oil	Reduced crude	Decarb. gas oil	Decarb. bottoms
Vol. % crude	100	18.2	36.1	22.5	13.6
Vol. % reduced crude	....	....	100	62.3	37.7
Gravity ° API	31.2	28.1	10.3	19.8	0.8
Color union	....	4	....	6 dil.	....
Sulfur wt. %	2.42	2.02	3.64	2.71	5.46
Ramsbottom carbon wt. %	....	0.01	11.3	2.07	24.6
S.U.v. @ 100° F.	....	77.2	....	....	....
S.U.v. @ 210° F.	....	....	593	110	....
S.U.v. @ 250° F.	....	....	277	....	....
Distillation	....	Vacuum	Vacuum	Vacuum	....
I.b.p.	....	480	590	570	....
10%	....	630	830	775	....
20%	....	650	....	845	....
30%	....	670	....	....	....
40%	....	685	....	....	....
50%	....	710	....	....	....
60%	....	740	....	....	....
70%	....	775	....	....	....
80%	....	810	....	....	....
Melting point ° F.	....	....	....	....	139
Penetration @ 77° F.	....	....	....	....	18
Penetration @ 100° F.	....	....	....	....	75
Metals p.p.m.					
Iron	0.29	....	....	....	....
Nickel	4.84	0.05	15.3	0.65	35.6
Vanadium	22.5	0.02	79.0	1.82	163

necessary to maximize separation of gas oils from asphaltic compounds.

The asphalt solution, containing about 50% propane, flows from the bottom of the decarbonizing tower. After the solution is heated in the asphalt furnace, most of the propane is flashed overhead in the asphalt flash drum. Any propane remaining in the asphalt is removed by steam in the low-pressure asphalt stripper. Asphalt product is run down to asphalt or bunker storage.

Decarbonized oil solution passes overhead from the decarbonizing tower. Propane in this stream is flashed in the low-temperature evaporator and flash drum. Any propane remaining in the oil is stripped out by steam in the decarbonizing-oil stripper. This gas oil can be charged directly to the FCC unit or run down to storage.

Propane, recovered from the asphalt and decarbonized oil, is condensed and returned to the propane work drum.

Propane Deasphalting

Although this unit produces deasphalted oil for lubricating-oil base stock, oil properties as well as unit operating conditions can be compared to the decarbonizing unit. The process is the same. Basic differences in operation are higher propane-to-oil ratio, and a charge stock of vacuum residuum instead of reduced crude.

Charge to this unit is vacuum residuum produced from Leduc crude. The deasphalted oil is used in blending bright-stock lubricating oil.

Design charge is 700 bbl. per day of vacuum residuum at a propane-to-oil ratio of 8:1. Yield and product properties for a typical Leduc vacuum residuum are shown in Table 3. Fig. 2 is a simplified flow diagram for this unit.

TABLE 3—YIELD AND PRODUCT PROPERTIES, CLARKSON REFINERY PROPANE DEASPHALTING UNIT, CRUDE—LEDUC 38.3° API—JUNE 4, 1959

Product	Vacuum residium	Deasphalted oil	Asphalt
Vol. % on crude	11.0	....	....
Vol. % on vacuum residium	100	47.1	52.9
Gravity	12.7	24.3	6.0
Color union	....	3¾	....
Sulfur wt. %	.60	.36	1.13
Ramsbottom carbon wt. %	3.53	.75	16.0
S.U.v. @ 210° F.	....	168	....
S.F.v. @ 250° F.	59	16.4	....
Penetration @ 77° F.	....	....	15
Distillation	Vacuum	Vacuum	....
I.b.p.	960	885	....
10%	1,020	995	....
20%	1,040	1,010	....
30%	1,070	1,025	....
40%	....	1,035	....
50%	....	1,055	....
60%	....	1,075	....
70%	....	1,095	....
F.b.p.	1,070	1,105	....
% recovery	30	75	....
% residue	70	25	....
Metals p.p.m.			
Iron	6.0	8.50	4.23
Nickel	11.5	1.55	24.0
Vanadium	14.0	0.30	18.0

Vacuum Units

Vacuum feed-preparation units at Montreal and Moose Jaw are conventional bubble-tray towers, having no demister pads. These units operate at about 50 mm. of Hg. Barometric condensers and steam jets provide the necessary vacuum.

Flow diagram for the topping and vacuum unit at Montreal is shown in Fig. 3 for East Venezuelan crude. Yield and product properties are given in Table 4.

Reduced crude is heated to the vaporization temperature of the gas oils and flows to the vacuum tower. Steam is injected with the reduced crude to prevent coking in the furnace tubes and to reduce the partial pressure of the mixture.

The vapors, including some entrained liquid, pass upward through the tower. The entrained and flashed material condenses from the gas-oil vapors in the stripping section of the tower. This oil, along with the bottoms liquid, is withdrawn as asphalt or bunker.

Gas-oil vapors pass overhead from the vacuum tower, and are cooled by heat exchange with the crude oil. Heavy vacuum gas oil condenses and is withdrawn from the system. Part of the heavy vacuum gas oil, along with a stream of light vacuum gas oil, is returned as reflux to the vacuum tower. The remainder is withdrawn as FCC feed.

Vapors which are not condensed in the heavy vacuum gas oil-crude exchanger pass into the final condenser where light vacuum gas oil condenses. Gas oil and noncondensables pass into the scrubber. Here noncondensables are withdrawn through the barometric condenser. Light gas oil passes out the bottom.

Delayed Coking

Moose Jaw. Fig. 4 is a flow diagram of the delayed-coking unit at Moose Jaw refinery.

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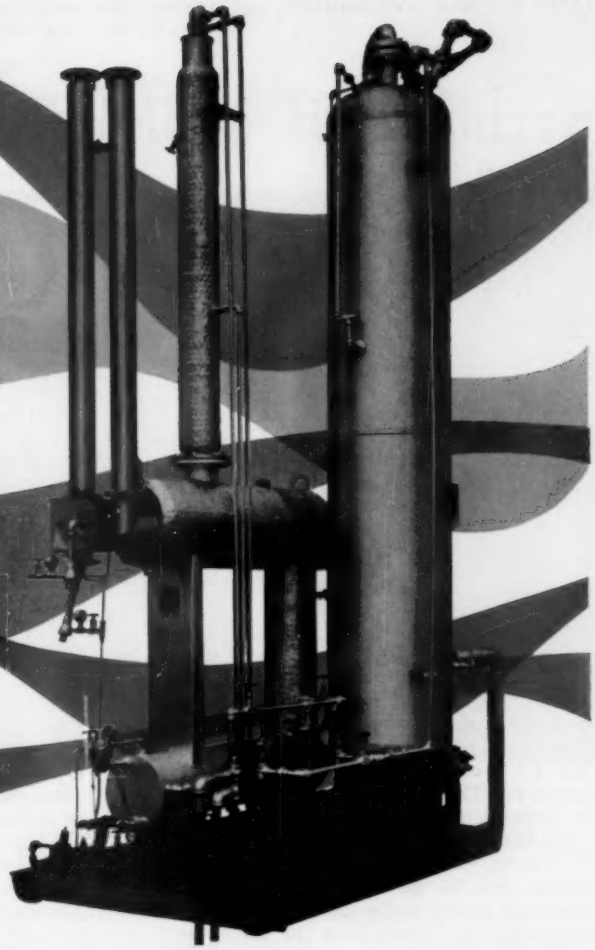

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TABLE 4—YIELD AND PRODUCT PROPERTIES, MONTREAL REFINERY TOPPING AND VACUUM UNIT, CRUDE—EAST VENEZUELAN (JULY 7, 1959)

Product—	Raw crude	Virgin gas oil	Reduced crude	Light vacuum gas oil	Heavy vacuum gas oil	Vacuum bottoms
Vol. % crude	100	9.8	35.8	3.1	19.5	13.2
Vol. % reduced crude	.....	.....	100	8.7	54.4	36.9
Gravity, °API	33.9	29.0	18.5	30.8	24.6	7.3
Color union	.....	2½	.....	2½	.....	.....
Sulfur, wt. %	0.83	0.67	1.25	0.52	0.94	1.93
Ramsbottom carbon, wt. %	.....	0.01	7.69	0.01	0.12	.....
S.U.v. at 100° F.	.....	65.6	.....	42.2	755.3	.....
S.U.v. at 210° F.	.....	36.7	.....	32.3	45.3	.....
S.F.v. at 122° F.	.....	.....	70.5	.....	.....	.....
Distillation	.....	Vacuum	Vacuum	Vacuum	Vacuum	.....
I.b.p.	.....	465	480	375	515	.....
5%	.....	545	590	415	610	.....
10%	.....	590	660	450	655	.....
20%	.....	635	740	480	705	.....
30%	.....	655	800	515	745	.....
40%	.....	675	.....	555	780	.....
50%	.....	700	.....	600	805	.....
60%	.....	720	.....	645	.....	.....
70%	.....	740	.....	705	.....	.....
80%	.....	770	.....	770	.....	.....
Melting point, °F.	.....	.....	.....	.....	.....	120
Pen. at 77° F.	.....	.....	.....	.....	.....	80
Pen. at 100° F.	.....	.....	.....	.....	.....	298
Metals, p.p.m.:						
Iron	0.70	.....	.....	.....	.....	.....
Nickel	7.7	0.01	18.6	0.01	0.02	40.5
Vanadium	44.5	0.05	110	0.05	0.05	229.0

coking unit through the fractionator. Light material in the residuum is flashed or fractionated from the heavier oil. This heavy oil, along with the internal heavy recycle oil, flows to the bottom of the coking fractionator. Charge withdrawn from the fractionator goes to the coking furnace. Residue is heated to thermal cracking temperature and flows from the furnace to the coke drums.

Coke-drum residence time is enough to allow coke to form which settles in the drum. Thermally cracked vapors pass from the coke drum to the fractionator and are separated into gas, gasoline, and gas oils. Heavy gas oil and vacuum residuum flow to the bottom of the fractionator. A coker gas oil is withdrawn from the side of the fractionator and is run down to storage for FCC-unit charge stock.

TABLE 5—YIELD AND PRODUCT PROPERTIES, EDMONTON REFINERY, CRUDE PEMBINA 38.0° API (RUN MAY 28, 1959)

	St. run heavy gas oil	Reduced crude	Heavy coker gas oil	Coke
Vol. % crude	19.3	27.6	.....	.....
Wt. % on crude	20.1	30.7	.....	4.2
Gravity, °API	30.8	20.2	14.2	.....
Color union	8+	Black	8+	.....
Sulfur, wt. %	0.16	0.32	0.36	0.53
Ramsbottom carbon, wt. %	0.12	5.08	4.17	.....
S.F.v. at 122° F.	11.9	257.0	10.5	.....
Volatile combustible matter	.....	.....	.....	14.0
Distillation	Vacuum	Vacuum	Vacuum	
I.b.p.	485	560	450	.....
5%	610	740	510	.....
10%	640	800	530	.....
20%	670	860	570	.....
30%	695	905	600	.....
40%	720	945	630	.....
50%	740	990	655	.....
60%	760	1,045	680	.....
70%	785	.....	700	.....
80%	820	.....	735	.....
90%	870	.....	770	.....
95%	915	.....	805	.....
F.b.p.	1,000	1,110	905	.....
Recovery	99	69	99	.....
Residue	1	31	1	.....
Metals, p.p.m.:				
Iron	2.63	1.75	1.98	.....
Nickel	1.80	1.06	1.33	28.0
Vanadium	0.19	0.10	0.03	10.0

Edmonton. The delayed-coking unit at this refinery is part of a combination unit including crude topping, thermal cracking, and delayed coking. The coking unit is similar to Moose Jaw's, except that thermally cracked light cycle oil is discharged into the combination tower. This tower serves as a common fractionator for both the delayed-coking and thermal cracking units.

Fig. 5 is a simplified flow diagram for the delayed-coking unit.

In this unit heavy coker gas oil is withdrawn from the lower section of the combination tower to a surge drum, where it is joined by reduced crude from the topping tower. The combined stream is charged to the coking furnace where it is heated to thermal cracking temperature.

The effluent passes from the furnace to the coke drum. A portion of this oil is cracked to extinction and separated from the other products of cracking. The vapors pass from the coke drum to the combination tower. The coke-drum vapors and those from the thermal cracking unit are fractionated into gas, gasoline, light and heavy gas oil, and tar.

Light gas oil is withdrawn from the upper dropout pan, and is charged to the thermal cracking furnace. Heavy gas oil is withdrawn as charge to the delayed-coking unit.

Yields and product properties are shown for this unit in Table 5.

Charge Qualities

Of the gas oils produced for FCC

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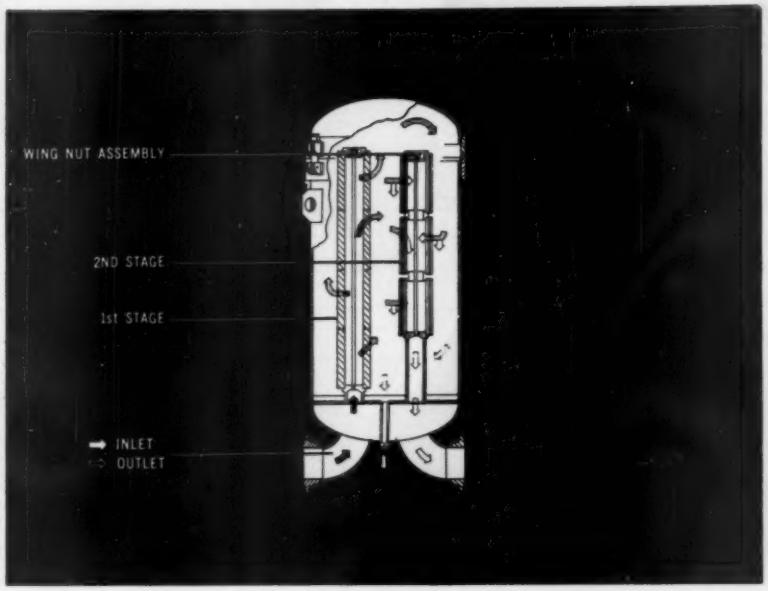

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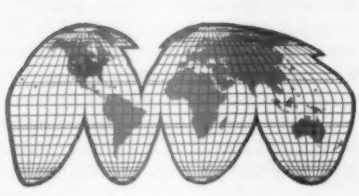


charge, decarbonized gas oil has the highest metal and carbon contamination. Since this gas oil is a product of extraction, the higher metal level is to be expected. Although metal content of this gas oil is checked only occasionally, results in Table 2, are considered typical.

Since it went on stream the decarbonizing unit has run at or near design rate. It produces maximum gas oil and a residue of 200° F. melting point (Venezuelan crude). Because of the high charge rate there has been little opportunity to determine the effects at different gas-oil selectivity on metals and carbon content in the decarbonized gas oil.

The most desirable application for a decarbonizing unit would be to process vacuum residuum for recovery of additional gas oil. In this operation maximum gas-oil recovery would be maintained but metal contamination would be reduced.

The metal level of gas oil produced from Montreal's topping tower varies occasionally due to tower upsets. The problem seems to be the periodic withdrawal of excess virgin gas oil. This causes loss of internal reflux below the point of withdrawal which results in asphalt contamination of the gas-oil stream.

Part of the problem is the inability of the decarbonizing tower to process additional reduced crude. At times of a high level in the bottom of the topping tower, the virgin gas-oil yield is increased to the point of losing internal reflux in this section. Tower upsets of this nature and the high metals level of the decarbonized gas oil have contributed to poisoning the FCC catalyst at Montreal.

At Edmonton it was originally intended to charge coker gas oil to the FCC unit. However, since this material is refractory and has a high carbon content, excessive coke and gas were produced. This stream had to be cut out of the FCC charge stock after about 6 months.

Since that time coker gas oil has been recycled to the coking unit. This change reduced the quantity of FCC charge stock and increased the charge to the coking unit. To compensate for this, the withdrawal of virgin gas oil was increased, resulting in poor fractionation and an increase in metal contamination.

Acknowledgment

The help of the management of our Moose Jaw, Edmonton, Clarkson, and Montreal refineries in contributing data and the guidance of F. L. Johnson and J. L. Porter in the preparation of this paper is gratefully acknowledged.

BOOKS

IGNEOUS AND METAMORPHIC PETROLOGY. By Francis J. Turner and John Verhoogen. Published by McGraw-Hill Book Co., Inc., 330 West Forty-second Street, New York 36. Price $12. 694 pp.

This book creates a unified general impression of the origin and evolution of rocks that have crystallized, or have been profoundly modified, at high temperatures.

The picture is based on field and petrographic data and on the physicochemical behavior of rock-forming minerals as determined by experiment and deduced from thermodynamic theory. It is correlated with concepts regarding the nature and prevailing conditions of the earth's crust and outer mantle. In this revision, igneous and metamorphic phenomena are treated as partially dependent on one another, since they are controlled by the same general physicochemical principles.

This second edition is largely rewritten and includes recent developments in experimental petrology and geochemistry. The section on igneous petrology reflects the increased scope of the field and summarizes the important experimental work that has been conducted in this area since 1954.

Theoretical principles are stressed throughout the book, and a rigorous treatment of thermodynamics is given where possible. Considerable space is devoted to the consideration of such fundamental principles as: the concepts of equilibrium and stability, the kinetics of chemical reaction, mechanisms of diffusion of matter in and between various media, and allied topics in the realm of physical chemistry.

This book is designed for advanced students, research workers, and teachers in the field of petrology.

ANALYSIS OF PIPE STRUCTURES FOR FLEXIBILITY. By John Gascoyne. Published by John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16. 181 pp. $7.50.

Recent developments in the petroleum industry involving the use of high-pressure and high-temperature piping system have made a great change in the attitude of plant designers to the importance of the analysis of pipe structures for stress and flexibility. Because of the very serious hazards that can accompany plant or pipe failure, rule-of-thumb methods of stress evaluation are no longer acceptable and the study of the many problems involved is rapidly becoming a specialist field.

Today, although many large design offices engaged on large-scale piping projects have found it prudent to set up special stress offices to deal with the problem, the piping designer is himself expected to be competent to perform routine analyses of the flexibility of his structures to ensure that they satisfy such codes of safety as may apply.

This volume is aimed principally at the piping designer. The author declares, "No attempt has been made to treat any aspects of the subject that are properly the responsibility of the highly qualified specialists; nevertheless it is hoped that the subject matter dealt with here may serve to stimulate the interest of the student engineer and provide him with a foundation on which to build a specialist knowledge."

Note: The Oil and Gas Journal maintains a book department. Write to the READER SERVICE DEPARTMENT, P. O. Box 1260, Tulsa 1, for copies of the book list. Often books reviewed here may be purchased from this source.

How Panhandle Eastern achieves simplicity in treating

Multiple cooling-water systems

Company revises 26 of 32 natural-draft towers to spray type, resulting in nearly $800,000 savings in investment

PART 2 OF TWO PARTS

BY J. T. RUSSELL
Chemical Engineer
Panhandle Eastern Pipe Line Co.

WHERE THE WATER is to be treated for several closely grouped cooling systems, it is usually advantageous to use a cascade arrangement of makeup-water flow to various systems. That is, blowdown from the initial system serves as feed for the second system, and so on, with blowdown water from all systems running to waste from the final cooling system. The cascade arrangement has several advantages:

... **Economy.** One sulfur-burner installation conditions the water for all systems.

... **Ease of control.** Setting the pH controller to maintain the desired alkalinity reduction in the first system conditions the water for all systems, and setting a dissolved-solids controller to maintain the maximum solids content of water in the last system automatically sets the solids contents of the preceding systems at lower, safer values. Thus, only two automatic controls serve to maintain correct treatment in all systems.

... **Selection of application.** Cooling water for critical services, such as for high-temperature equipment, engines, shell-and-tube exchangers, etc., can be supplied from the initial system. Water in this system is lowest in pH and dissolved-solids content and therefore least likely to deposit scale. Less-critical services can be supplied with water from the other systems.

Examples of Cascade Systems

Fig. 1 illustrates a cascade arrangement of makeup water flow used at many of Panhandle Eastern's compressor stations. Makeup water for open cooling systems is handled by this arrangement.

The most critical service is that of engine-jacket cooling by open-system water. Here metal temperatures are higher and therefore the tendency toward scale deposition is greatest. Also, the jackets of large horizontal gas engines present opportunities for any suspended solids to settle and bake on hot surfaces. For these reasons the open jacket system is the initial member of the cascade arrangement.

The next most critical service is that of cooling closed-system jacket water. Metal temperatures are lower in this system, and, because atmospheric sections are used for heat exchange, the danger of suspended settling and baking on hot surfaces is removed. The cooling system handling closed jacket water is placed second in the cascade arrangement.

The least critical service is that of cooling gas in atmospheric sections, so that systems for gas cooling are at, or near, the tail end of the cascade arrangement.

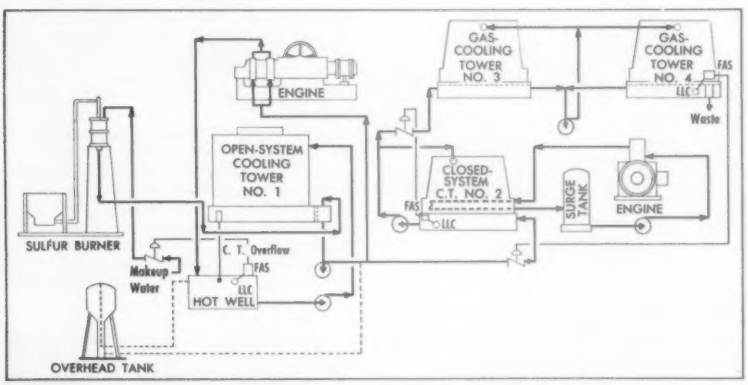
Fig. 2 shows a flow diagram of a cascade arrangement used to eliminate hydrogen sulfide (H_2S) from makeup water to both open and closed packet-cooling systems. The raw water contains 0.07 p.p.m. of H_2S, and this contaminant has caused quite rapid corrosion of brass and bronze valves, fittings, pump impellers, etc.

To eliminate the H_2S, the raw water is conditioned by a sulfur-burner installation, the low pH of the water in the absorber chamber of this installation aiding in the stripping of this contaminant from the water. Additional stripping by air in the open-system cooling tower serves to further reduce the H_2S concentration. An inhibitor is added to the open-system water to mitigate corrosion caused by any traces of H_2S or by oxygen.

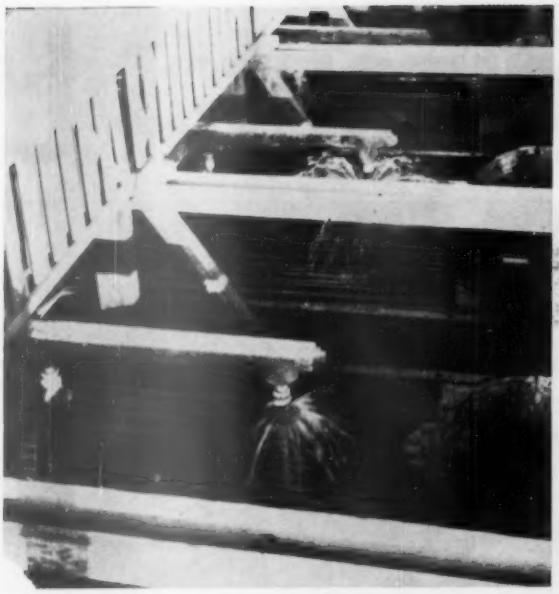
A sidestream of open-system water, after being filtered, continuously flows through the closed system and is subsequently used to partially satisfy the makeup requirements of two gas-cooling towers, equipped with atmospheric coil sections. Because the polyphosphate of the inhibitor used in the open-system water slowly reverts to the orthophosphate form, which would precipitate "lime" as calcium phosphate, it is necessary to limit the retention time of the water in the closed system, hence the continuous flow-through arrangement.

As a final example of the application of cascade arrangements at stations along Panhandle Eastern's main lines, Fig. 3 shows a flow diagram for cooling water at a station where fouling of the aerial coolers by oil in the semiclosed-system jacket water was the problem. Oil has been the bugaboo where aerial coolers have been used to remove heat from jacket-water-cooling large horizontal gas-compressor engines. At one station on another natural-gas transmission line, oil had so fouled the aerial coolers in a little over a month of operation that 9° F. lower exit temperatures were obtained by blowing a rubber plug through the tubes of one of the coolers.

A detergent is added to the open-jacket system, shown in Fig. 3, to solubilize any oil and prevent its ac-



CASCADE ARRANGEMENT is used for makeup water on open cooling systems at many of Panhandle Eastern's compressor stations. Fig. 1.



TOWER CONSTRUCTION formerly allowed debris from birds' nests and the air to accumulate in the tower and eventually plug water spreaders. Only two of eight water spreaders are shown operating here.

NEW TOWERS provide for excellent water distribution. Basin water is screened before it enters circulating pump and water piping and thus allows no opportunity for contamination.

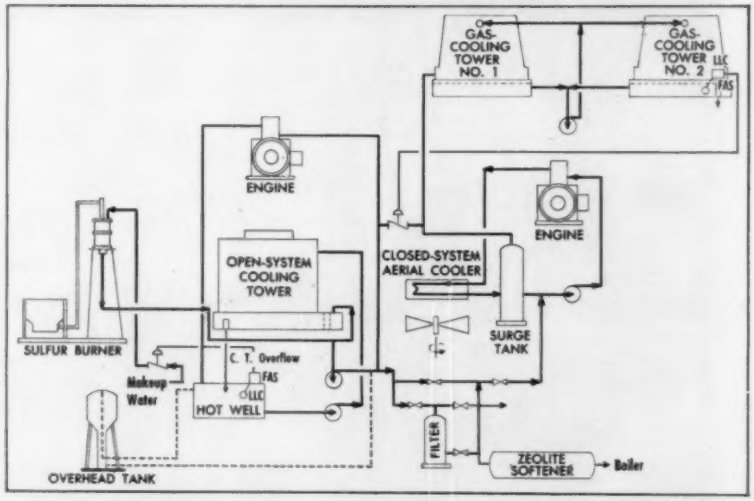
cumulation inside the aerial coolers. A sidestream of open-system water is used as makeup for a gas-cooling tower, thereby providing a means of continuously purging oil from the open system. Final elimination of oil is effected in blowdown from the gas-cooling tower. The atmospheric sections in this tower show no evidence of oil coating, and swabs from the aerial coolers, with and without the use of detergent, show positively the addition of detergent is necessary to avoid fouling. The system shown has been in operation since late 1957, with little evidence of fouling being noted.

Simplicity in Cooling Tower Design

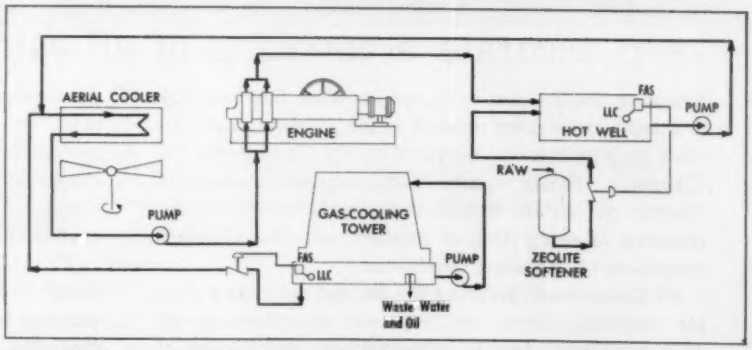
The efficient operation of natural-draft cooling towers along Panhandle Eastern Pipe Line Co.'s main lines presented a serious problem: maintaining reliable and ample water distribution over the atmospheric gas-cooling coils in these towers. This problem arose because of the virtual impossibility of keeping distribution laterals and water spreaders open and operating.

Trouble with natural-draft towers. The manner in which the towers were necessarily operated contributed to the problem. In the wintertime, warm water was discharged only to the riser leading to the collector trough in order to avoid ice accumulation which might break the tower down should the warm water be discharged farther up in the tower.

A current of warm air, plus a dry

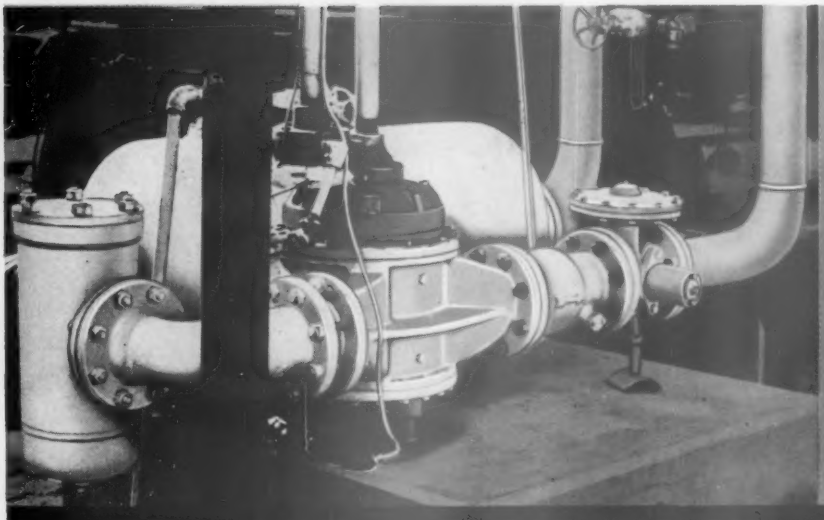


CASCADE ARRANGEMENT is used to eliminate hydrogen sulfide from makeup water to both open and closed packet cooling systems. Fig. 2.

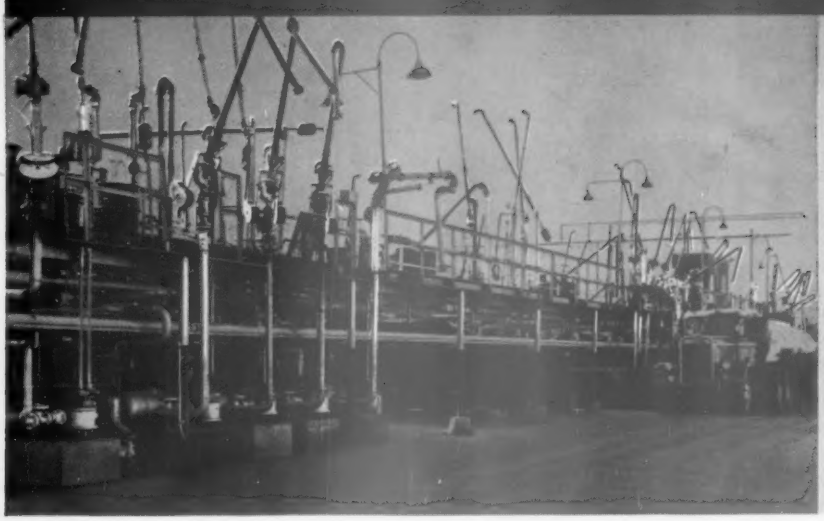


OIL PROBLEMS have arisen when aerial coolers have been used to remove heat from jacket-water-cooling large horizontal gas compression engines. Fig. 3.

Continental Oil



SPECIAL PRODUCT LOADING
Three-inch S-35 Smith-Erie Meter assemblies equipped with temperature compensators, set stop valve, strainer, set stop mechanism and barrel counter. Printed meter ticket checks reading against refinery production.



LOADING TERMINAL
Approximately 30 Smith-Erie meters are in service loading products into trucks of Continental's customers, and tank cars for rail shipment. These meters are equipped with temperature compensators, deaerators, flow rate control valves, set stop mechanisms delivering gross gallons and printed tickets.

At Denver Terminal, separate Smith-Erie meter systems keep accurate accounting of all sales and transfers

Knowing the ins and outs and knowing them *exactly* is a must at complex product refinery-loading installations such as this one operated by the Continental Oil Company. Small wonder this progressive company "counts on" Smith-Erie meter systems for precise accounting of every drop of finished petroleum product regardless of operating conditions.

At Continental, knowing the ins and outs has a double meaning. Here, two separate operations go on simultaneously. One is intra-company distribution of the product from refinery to Continental trucks. The other is an out-sales situation involving transfer of product from refinery to trucks owned by Continental's customers. In both cases, Smith-Erie meters save costly manpower . . . provide for direct throughput . . . cut evaporation losses.

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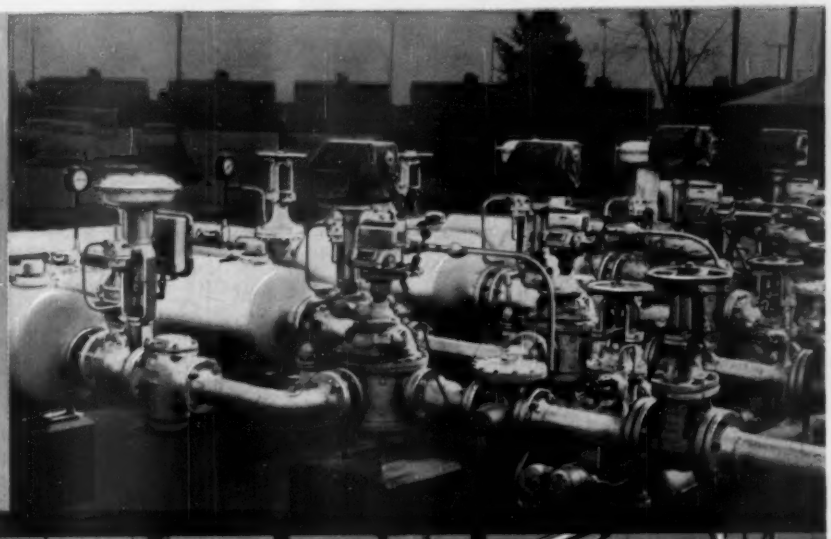
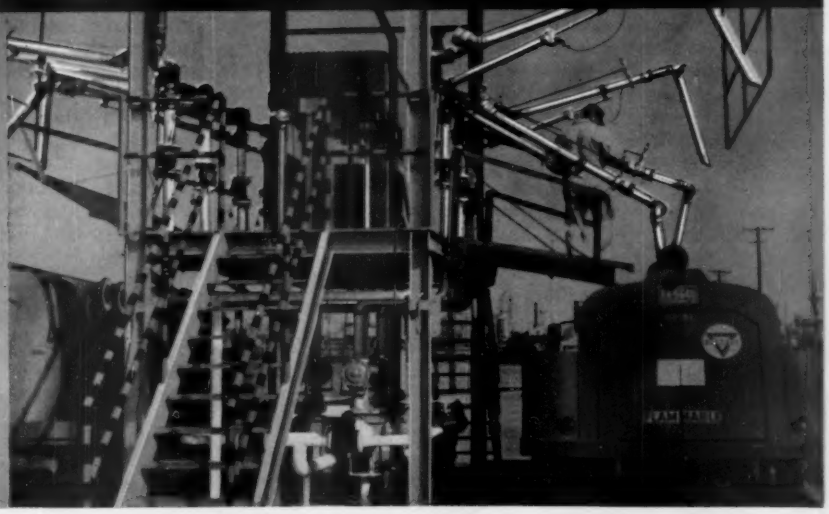
MARKETING STORAGE

Two Smith-Erie AS-35 and two AS-50 meter assemblies measure finished products from refinery production into tanks for Continental's own marketing division. Meters are equipped with temperature compensators, gross and net counters, set stop valves, deaerators and strainers. Readings are checked against refinery production and retail deliveries.



MARKETING DELIVERY

Four Smith-Erie AS-35 meters with accessories record loading of finished petroleum products into Continental trucks for delivery to Continental stations. This completes accurate record between manufacturing (refinery production) and deliveries against sales. Meters account for every drop and print a temperature-corrected record — automatically.



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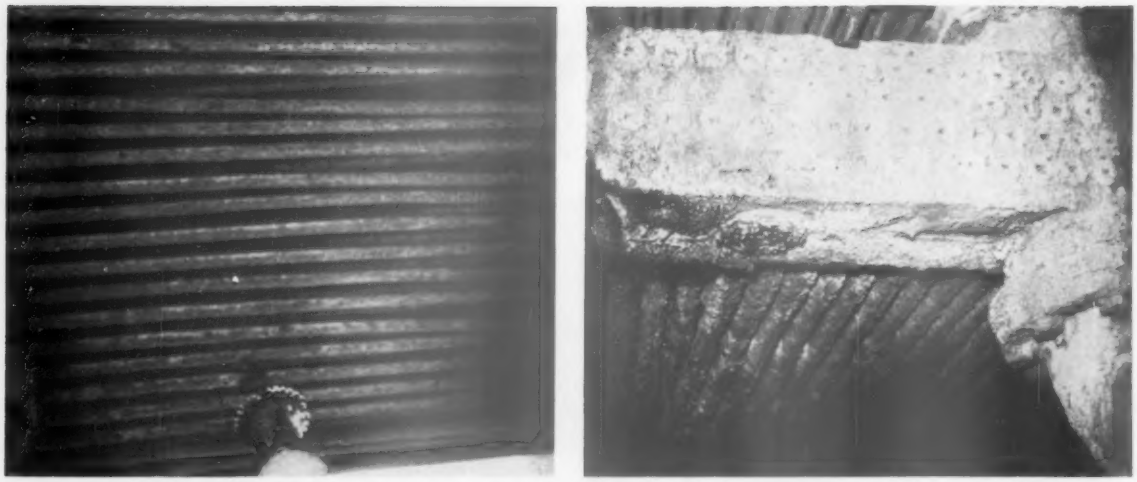

POOR WATER DISTRIBUTION causes poor heat transfer and scaling of the cooling coils. Scale on the top side of a coil is shown at left, and scale on the bottom side of the same coil is shown at right. Note the cratered appearance of the bottom-side scale. This is a tell-tale mark of water starvation arising out of poor water distribution.

tower superstructure, made an ideal place for birds to roost, and, in early spring, to build nests. When water was turned over the upper portions of the tower, an accumulation of young birds, bird's nests, straw, etc., was washed into the collector trough, distribution laterals, and water spreaders.

This debris was released over a period of time, so that a general tower cleaning in early spring would not suffice to guarantee trouble-free operation during warm weather. Cleaned spreaders and laterals have been found over 40% inoperative the following day.

The inevitable result of such poor water distribution was (1) poor heat transfer, and (2) scaling of the cooling coils.

Spray-type cooling tower . . . About 5 years ago Panhandle Eastern faced the necessity of either rebuilding nearly all of the natural-draft cooling towers along its system, and continue to obtain the poor water distribution these towers afforded, or to design a tower which would avoid stoppage of laterals and spreaders (or sprays).

The decision was made to revise a natural-draft tower in gas-cooling service and to observe its performance for at least a year. Somewhat later a tower-cooling closed-system engine-jacket water was revised to the spray-type to obtain additional data.

The tower louvers can be turned flat to form a solid wall, or they can be turned at a 45° angle to provide for the passage of air. In areas of high winds it has been found desirable to install a partition lengthwise through the center of the tower to limit windage loss.

These towers provide excellent water distribution. They present no opportunity for debris to stop laterals and sprays, since the basin water is screened before it enters the circulating pump and water piping, with no opportunity for contamination before it is delivered to the sprays.

The downward spray of water induces a concurrent flow of air, so that the tower can operate on still days. Even so, because of the concurrent flow of warm water and cooling air the temperature of cooled water does not generally approach the wet-bulb temperature as closely as for the natural-draft tower. However, because of the better water distribution it affords, the approach of the cooled-gas temperatures to the wet-bulb temperatures for the spray-type tower were closer than for the same tower, operating as a natural-draft tower, before it was revised.

Table 1 presents the operating temperatures of the same tower, operating as a natural-draft tower and as a spray-type tower, under as nearly identical atmospheric and wet-bulb temperature conditions as could be obtained. The data for the natural-draft tower are for conditions as it was being operated, on the average.

TABLE 1

Operating Data: (1) Natural-Draft Cooling Tower, and (2) Same Tower Revised to Spray Type.

	Natural draft (°F.)	Spray type (°F.)
Atmospheric temperature	60	56
Wet-bulb temperature	52	53
Cooled-gas temperature	92	77
Approach, cooled-gas temperature to wet bulb	40	24
Cooling-water temperature	81	77
Basin-water temperature	85	79
Cooling range, gas	19	25
Cooled gas volume, M.c.f.d.	174,000	166,000

Because of better water distribution, the cooled-gas temperature approached the wet-bulb temperature 16° F. closer for the spray-type tower than for the natural-draft tower (24° vs. 40° F.) Also nearly the same volume of gas was cooled through a 6° F. greater cooling range by the spray-type tower than by the natural-draft tower (25° vs. 19° F.)

As a result of the better water distribution by the spray-type towers, scale which was deposited when natural-draft towers were operated is being removed, even with the water treatment and the analysis of the cooling water remaining essentially the same.

These spray-type towers are not without their limitations. Warmer cooled-water temperatures have been mentioned. Where cooled-product temperatures must be as near wet-bulb temperatures as possible, the application of a spray-type tower is questionable. Applications which cannot tolerate cooled-product temperatures as high as 110° F. in summer will avoid use of spray-type towers of the design used by Panhandle Eastern.

However, where the spray-type towers can be applied, they are an economical means of cooling. All but six of the natural-draft towers along Panhandle Eastern's system have been revised to the spray type—26 in all. The cost of revising these towers was very nearly one-fourth that of providing new natural-draft towers. This meant nearly $800,000 less investment in cooling towers.

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PIPELINING

PART 4—CORROSION
(Conclusion)

Oil analysis can cut cost

A 1-YEAR test program has shown the usefulness of the analysis of engine lubricating oil in detecting excessive component wear well in advance of engine breakdown.

Although the use of some types of detergent oils appeared to make interpretation of the analysis difficult, the data obtained from the second test period showed that detergent-oil analysis can be used for indication of wear rate if a sufficiently large enough change in contaminant concentration is permitted before abnormal wear is assumed to be taking place. It may also be desirable to sample detergent oils more frequently than nondetergent oils to improve the reliability of the analyses and sampling.

Most of the engines which used nondetergent oils and operated normally during the entire test program maintained very low contaminant concentrations in their oils. The oils from some engines, however, had significantly higher concentrations of one or more contaminants, although these engines also maintained normal operation with no indication of excessive wear. Several reasons for this are apparent:

- The use of such materials as lead-containing sealing compound and molybdenum disulfide lubricant can cause interference by their presence in the crankcase oil.
- Oil-filter systems which do not efficiently remove small amounts of contaminants from the oil will allow normal wear products to build up to a higher level of concentration than would normally be expected.
- Engines which have only slightly higher than average rates of wear will maintain higher than average levels of contaminants in their lubricating oils.

It is evident that suspicion of abnormal wear rate in an engine should be based on a significantly increasing concentration of one or more contaminants above the normal level for that particular engine, and not necessarily on the fact that the contaminant level is higher than in oils from other engines.

Although some of the engines which were used in the test program contained aluminum bearings, no failures were reported, and no indications of bearing wear were obtained from the oil analyses. The usefulness of oil analyses as a measure of aluminum bearing wear was, therefore, not established in this study. Members of the project-supervising committee reported, however, that from their experience, when aluminum bearings fail they fail so rapidly that monthly oil analysis would be too infrequent to be of value.

The effective use of oil silicon content to indicate air-filter condition was reported by one of the participating companies. It was found that a silicon content in excess of 3 p.p.m. indicates poor air filtration, and filter maintenance is carried out promptly when the silicon concentration reaches this value.

A sizable saving could be realized if engine overhauls were made only when required. The use of lubricating-oil analysis in conjunction with present inspection methods appears to be sufficiently accurate in determination of the condition of an engine to make an extended overhaul interval feasible without sacrifice of reliability.

The results of this study show that the lube-oil analysis method is very sensitive in detecting increases in wear rates. Warning of engine trouble is thus given sufficiently far in advance to permit reasonable scheduling of major maintenance.

In addition to providing savings in overhaul expense, lube-oil analysis should help prevent sudden engine failures due to excessive wear which was not detected by the usual inspection methods.

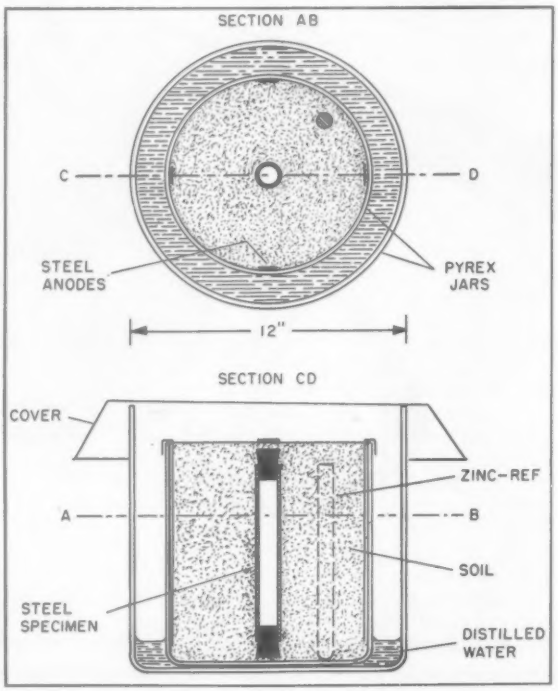
Recent tests show the best way of

Using cathodic protection

WHEN cathodic protection is applied to pipelines (or other steel structures) in a high-resistivity soil, the potential should be kept at −0.77 volt, with reference to a saturated calomel electrode. For best results in mitigating location-action corrosion, voltage drop caused by externally applied protective current should be excluded from potential measurements.

A potential of −0.77 volt, previously shown to protect steel cathodically against corrosion in low-resistivity environments, also afforded the highest degree of protection in a high-resistivity soil, according to a recent National Bureau of Standards test.

This potential, referred to a saturated calomel electrode, is equivalent to −0.85 volt referred to a copper-copper sulfate electrode. Best results were achieved when voltage (IR) drop between the reference electrode and the metal, caused by the protective



THIS arrangement was used in exposing steel specimen to low-resistivity soil for test. Fig. 1.

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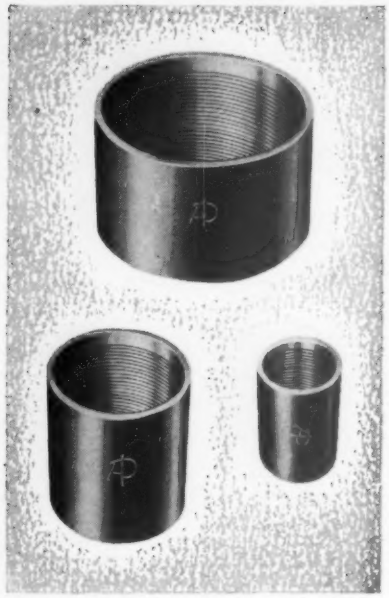

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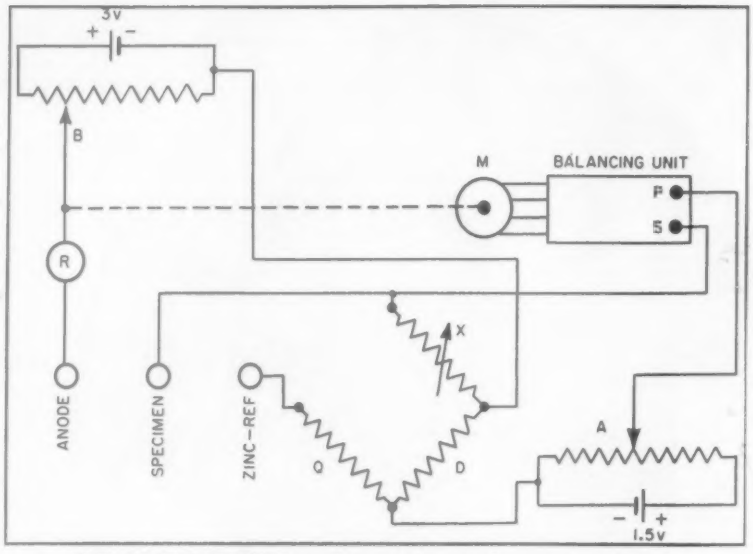


ONE OF THE CIRCUITS used in testing steel corrosion. Fig. 2.

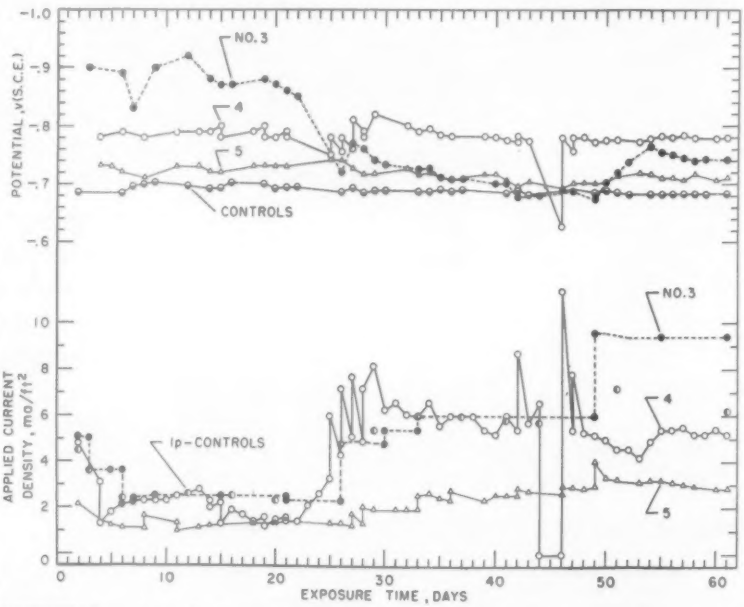
current, was excluded from potential measurements.

As the underground corrosion of iron or steel is mainly an electrochemical phenomenon, the electric potential at which a metal structure should be held to prevent the destructive process is of practical importance. Insufficient potential will give inadequate protection. On the other hand, maintaining a greater potential than is needed represents waste.

Test and Results

Earlier studies of cathodic protection at the bureau were conducted with soils and water having resistivities of less than 1,000 ohm per cm. In these environments, measured potentials were virtually free of IR drop. In high-resistivity environments, however, measured potentials made on underground structures often include considerable IR drop as well as polarization voltage.

W. J. Schwerdtfeger, of the bureau's corrosion laboratory, undertook the present study to find out whether this IR drop, which under some circumstances has theoretical value, is beneficial under practical conditions, for example, in potential measurements made on pipelines. Also evaluated with respect to a high-resistivity environment were polarization techniques, formerly used successfully to



POTENTIAL and applied current density for three specimens; protective current requirement shown for two controls. Fig. 3.

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CENTER SEAT FOR OPERATOR — Sitting in seat located directly over center of machine, operator can keep casing lined up perfectly with hole being bored.

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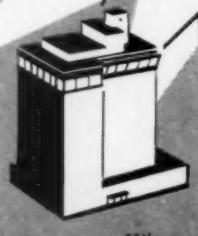

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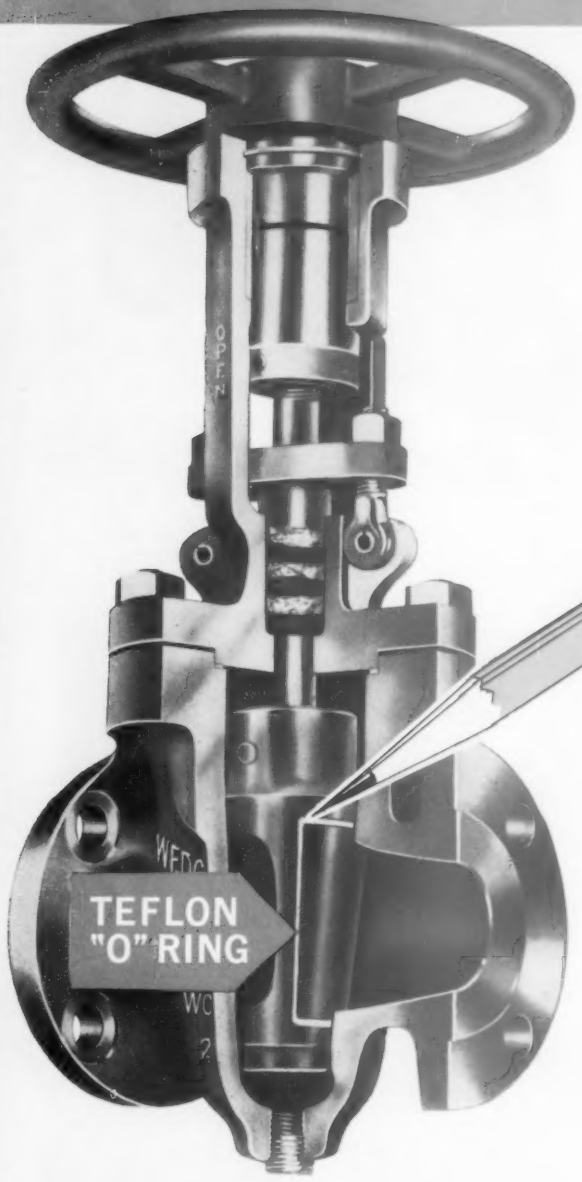

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determine the amount of external current needed for protection.

For the experiment, five specimens, 8 in. long, were cut from one piece of cold-drawn steel tubing (1 in. in outer diameter) and treated to confine corrosion to the outside surfaces. A sand loam soil, having a resistivity of about 20,000 ohm per cm. was the corrosive medium.

The specimens were completely surrounded with the soil and held individually in cylindrical jars which were placed inside larger covered jars containing enough distilled water to create a saturated atmosphere. Electric connections were attached to the specimens and to a high-purity zinc rod exposed with each specimen as a reference electrode.

A circuit was designed for maintaining one specimen at a protective potential free of IR drop. It used both a bridge for balancing out the IR drop between the specimen and the zinc rod, and an electronic balancing unit for controlling the potential of the specimen. A similar circuit was used, in conjunction with a synchronously driven voltage divider and a two-pen recorder, for automatically obtaining polarization curves on all specimens.

Two of the specimens were without cathodic protection, serving as controls, while the other three had currents applied during a 61-day exposure period. The current to the third specimen was adjusted in accordance with mean values of current from cathodic polarization curves obtained on the two control specimens. The potential on the fourth specimen was maintained at −0.77 volt, free of IR drop, and on the fifth, at −0.77 volt, including IR drop.

The current applied to the specimen held at −0.77 volt, free of IR drop, was continuously recorded. Potentials between specimens and zinc electrodes, including IR drop caused by applied current, were measured almost daily, followed by measurements of the same potentials, without IR drop. Finally, after potentials of the zinc rods were measured with reference to a saturated calomel electrode, the specimen potentials were converted to the saturated calomel scale.

An analysis of the results showed that the specimen held at −0.77 volt, without IR drop, lost the least weight from corrosion during the exposure period. The other two specimens were protected to a lesser degree because of insufficient polarization. Thus, the experiments indicate that the highest degree of cathodic protection is achieved when IR drop caused by the protective current is balanced out. In fact, the data show that IR drop included in the potential reading can be very misleading, especially in a high-resistivity soil, and that any indication of protection contributed by IR drop should be viewed with caution.

As in previous studies, it was found that cathodic polarization curves are a reliable means for measuring the current required for cathodic protection. Applied current density indicated by the break (change-in-slope) in the cathodic polarization curve agreed quite well with the actual current density found necessary to maintain polarization at −0.77 volt, free of IR drop. The current required for protection was approximately three times the magnitude of the corrosion current.

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Petroleum Storage Tank, Clyde Refinery, Photograph by courtesy of The Shell Refining (Australia) Pty. Ltd.

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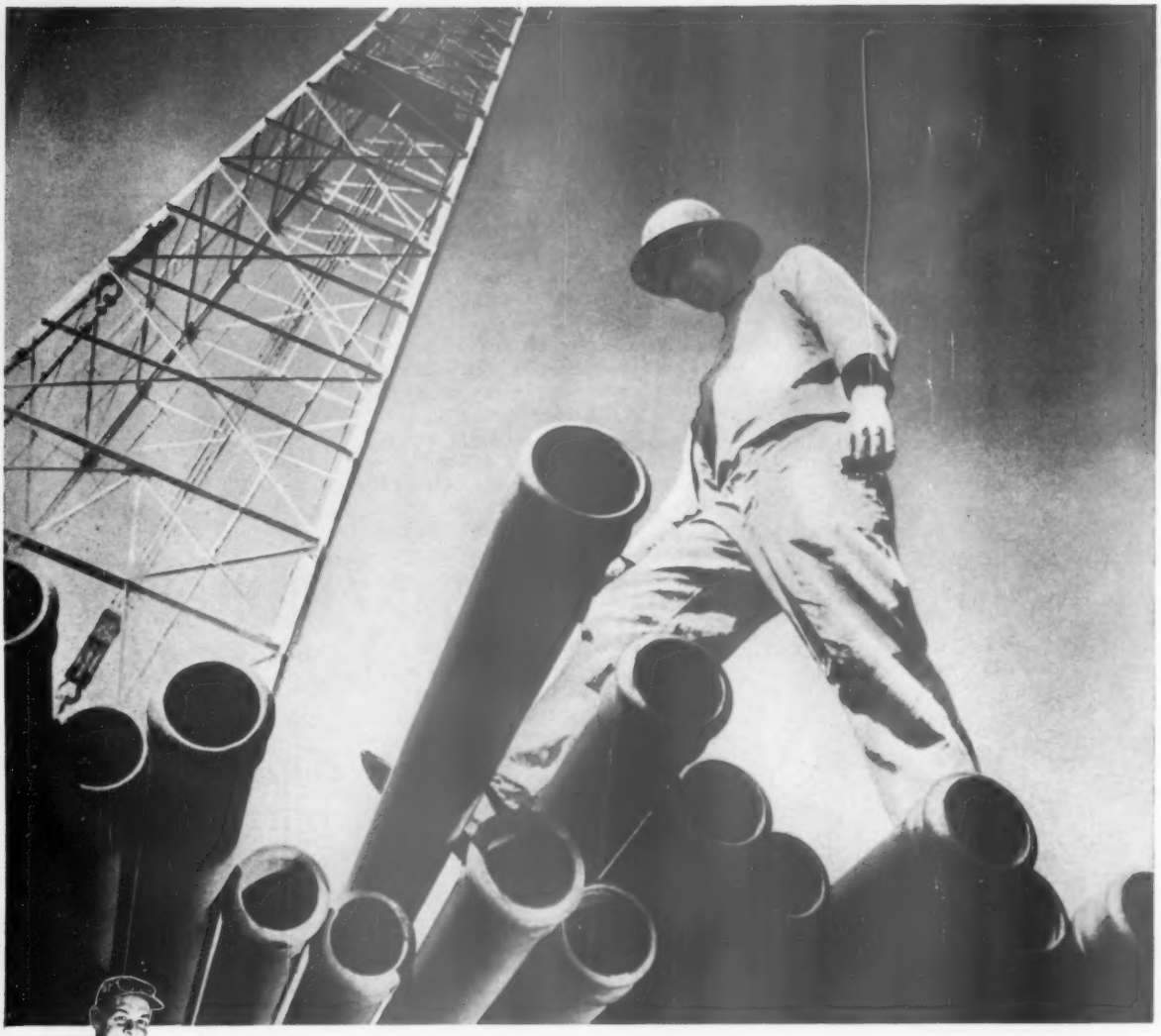

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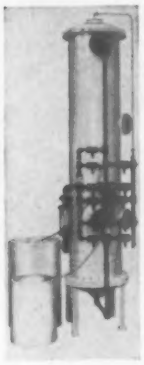
Demineralizer



. . . installed quickly as it comes as a packaged unit. On-site erection of the Model M Uni-Pac unit consists of setting the unit in place and connecting to air and raw-water supply, treated-water outlet, and open drain. The only electrical connection required is for a conductivity controller which uses 110-volt, 60-cycle power.

The demineralizer comes in capacities from 2,100 to 13,200 gal. per hour using raw water with 10 grains per gal. total exchangeable anions.

The operating valves and piping are corrosionproof polyvinyl chloride. The exchange tanks are lined with the same material. Auxiliary polyethylene regenerant tanks are provided for acid and alkali. Source: **Cochrane Corp., Seventeenth Street, below Allegheny Avenue, Philadelphia 32.**

●

Chart recorder

. . . accurate to ¼% has been disclosed. The round-chart recorder has a minimum accurate scale span of 1 mv. d.c. Optional response times are 4, 10, and 24 seconds full scale. The recorder is a null-balance, potentiometer type. A zener diode, which eliminates use of a dry cell or standard cell power supply, offers a constant voltage reference accurate to ±0.05%. The temperature coefficient is 0.001% per °C.

Maintenance is made easy by use of a hinged face that swings out to expose the entire inside of the instrument. All components are easy to get to for replacement. To further speed service, printed circuit boards and plug-in components are used.

The recorder is available for surface or semiflush mounting. It measures 17⅛ in. wide, 16⅞ in. and 17⅞ in. deep, respectively. Single and two-pen models are available. Charts speeds available are 1, 8, 12, or 24 hours, and 7 days. Normal delivery time is 4 to 6 weeks. Approximate price, f.o.b. factory, is $750. Source: **General Electric Co., Schenectady 5, N. Y.**

Supervisory control system

. . . is an electronic type of unit that provides push-button control for remote and local well testing and production. Compared with conventional methods, the system promises to increase efficiency and economy by eliminating human error and by speeding up operations.

Considered applicable to virtually any remote lease, either offshore, on land, or in marshes, the system uses modular construction so as to be compatible with further developments in the maker's automatic-control instrumentation. Nerve center of the system, as shown, is the Model DPC-1 dispatching console. Source: **Southwestern Industrial Electronics Co., Div. of Dresser Industries, Inc., Box 22187, Houston 27.**

Hauling tank in four shapes

. . . and styles for transporting bituminous materials is on the market. The tanks are specifically designed and constructed to customer specifications for the transportation of hot bituminous materials, heavy fuel oils, wax, and chemicals.

Model TR is taper-shaped and gives fast, positive drainage at the rear. Its round cross-section offers a strong tank shell. Model D-TR has a doubled-tapered design. It is tapered toward the center to provide positive center drainage.

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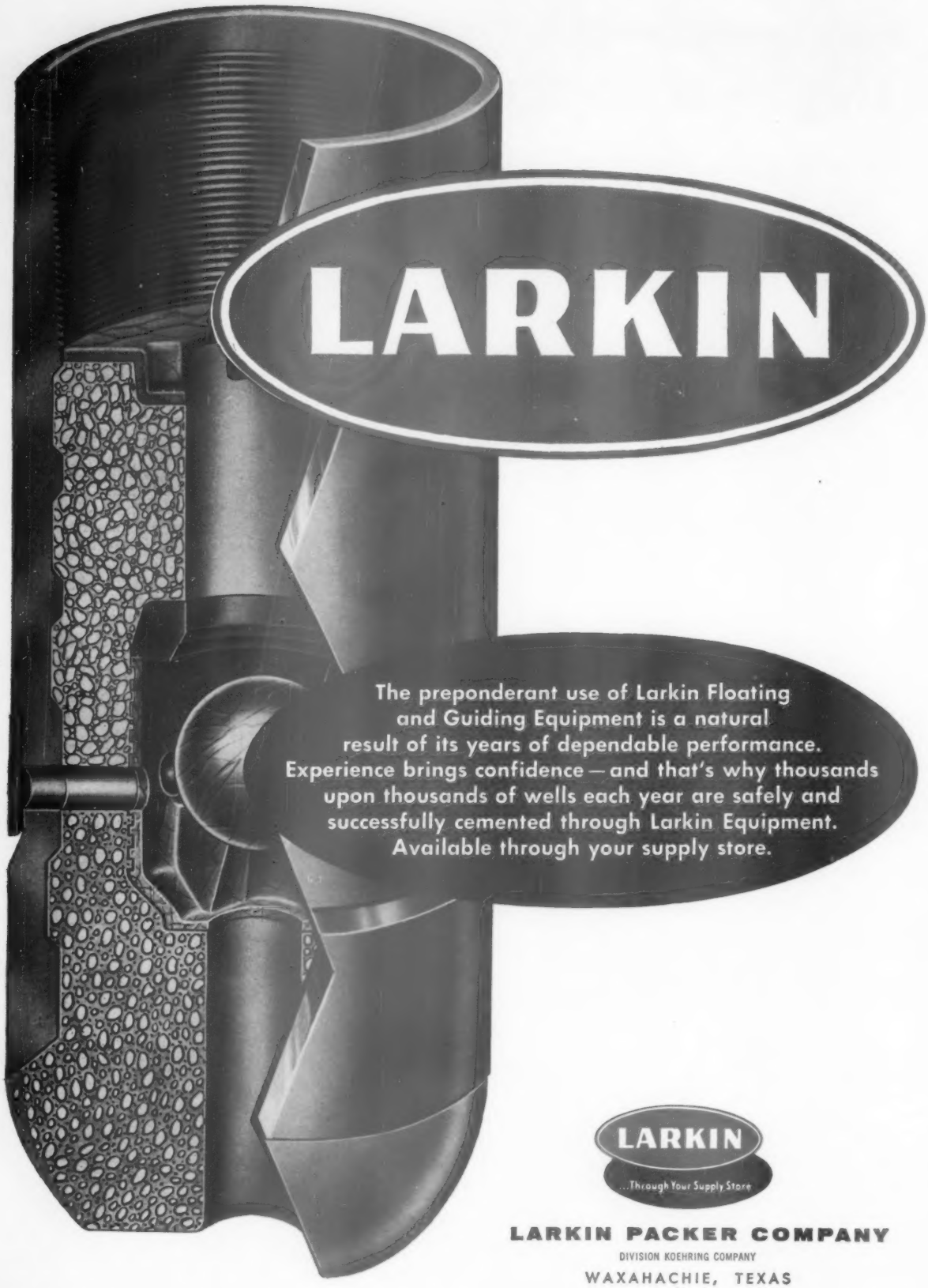
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Model LW-R is a cylindrical tank which, the maker says, offers the greatest capacity per pound of tank shell. The fourth shape is straight oval. According to the manufacturer, it has the lowest possible center of gravity and maximum payload. Details are given in Bulletin 114. Delivery time: 4-5 weeks. Source: **E. D. Etnyre & Co., Oregon, Ill.**

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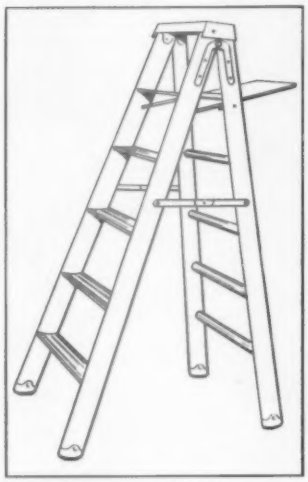


Stepladder

. . . is reinforced with glass fiber and promises to prove particularly useful as it is both lightweight and highly nonconducting. When tested under room conditions of 50% relative humidity, the ladder did not break down when a maximum of 120,000 volts was applied between rungs, the maker reports.

The flat steps and back rungs are of aluminum. A solid balsa wood core gives excellent deflection results, the maker says. The ladder comes in 3 to 18-ft. sizes in 1-ft. increments. All sizes above 3 ft. have a pail rest. Approximate weight per ft. ranges from 4¾ lb. for the 3 to 12-ft. sizes up to 5¼ lb. for the 14 to 18-ft. sizes. Prices range from about $8.90 to $9.90 a ft. Source: **Putnam Rolling Ladder Co., Inc., 32 Howard Street, New York 13.**

●

Distillation problems

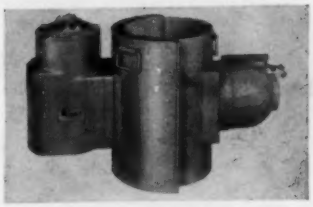
. . . can be solved with a new analog computer, the maker reports. The Dystac computer (dynamic storage analog computer) has demonstrated the ability to handle such problems as simulation of the number of plates required for a given separation in a binary distillation problem as well as multicomponent distillation problems.

The computer system, the maker says, synthesizes the traditional advantages of both analog and digital computers. All logic elements operate with a frequency response adequate for 60 solutions a second. The basic computer is available with 48 amplifiers. These can be field-expanded to 70 operational amplifiers. Delivery time for the computer is 4 to 6 months. Price ranges from about $20,000 to $100,000. Source: **Computer Systems, Inc., 611 Broadway, New York 12.**

●

Gage measures

. . . density of fluid or slurry using gamma radiation. Made in two models, LRV and LR, the new gage continuously and automatically measures specific gravity, per cent solids, or interface passage of liquids in pipes with diameters from 10 through 16 in.



Both models can be built into lines, or they can be bolted around the out-

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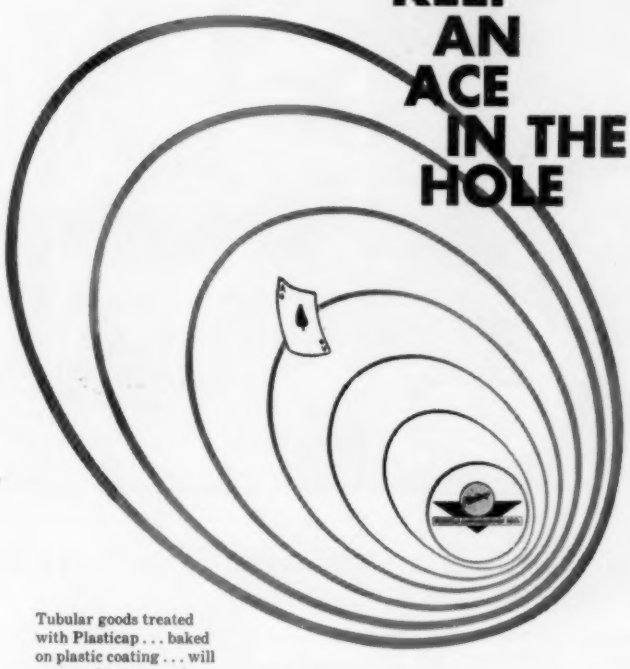

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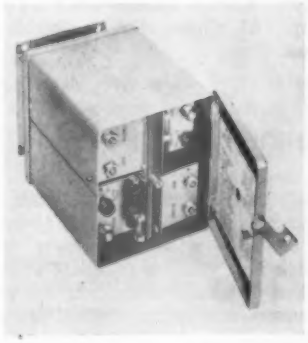
New Equipment

side of existing piping. No gage parts touch the fluid measured. Too, the gages have no moving parts.

The radioactive gamma source is heavily shielded. This permits general license distribution by the Atomic Energy Commission to companies with no prior radioisotope experience. The maker's standard design is explosion-proof.

Both gages operate on the principle that the intensity of radiation detected by the measuring cell is proportional to the density of the material flowing in the pipe. Measurement spans as narrow as 0.05 specific gravity units are attainable on 16-in. pipes, the maker says. Precision as high as 1% of scale can be obtained. Details are given in Bulletin 112.

Delivery time is 8 to 10 weeks. Approximate list price ranges from $2,030 for Model LR 200-10 for use on 10-in. pipe to $2,235 for Model LR 100-14 for use on 14-in. pipe. Approximate list price ranges from $3,255 for Model LRV 100-10 for 10-in. pipe to $3,375 for Model LRV 50-14 for 14-in. pipe. Source: **Ohmart Corp., Box 67, Station B, Cincinnati 22.**



Alarm sounds

. . . at preset point and is self-powered. The R2A electronic alarm can be used to actuate an annunciator or to perform an auxiliary control function when a process signal reaches a preset point.

It is equipped with a built-in power supply and adjustable alarm-point signal. But the unit can be installed with the alarm-point set from a remote location. This feature permits flexibility in monitoring process variables.

A null-balance device, it can be used for one or two-point alarm, operating independently of the instrument circuit or in parallel with any of the manufacturer's indicator-recorder-controller combinations.

The basic components for a single alarm are mounted on two printed-circuit cards. Each unit has slots for two sets of these cards. This permits both low and high-limit alarms.

Operating from a 0 to 0.5-volt a.c. signal, the device compares the process signal with the adjustable alarm-point signal in a difference amplifier. Details are given in Specification Sheet A809. Delivery time for the R2A is 8 weeks. Approximate list price, f.o.b. factory, ranges from $175 for a single alarm to $275 for a double alarm. Source: **Swartwout Co., 18511 Euclid Avenue, Cleveland 12.**

Grease cartridge

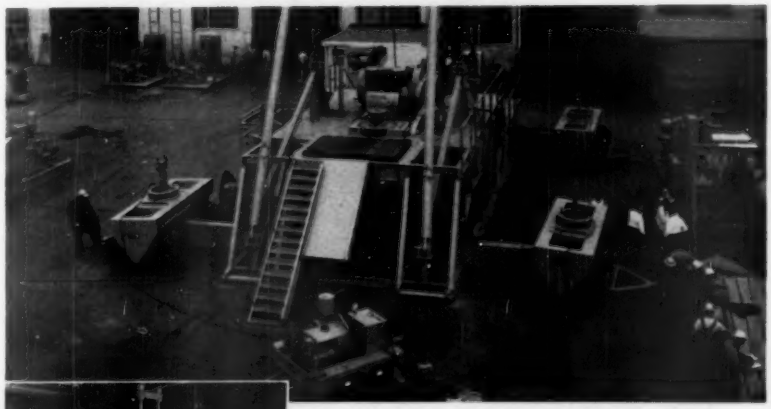
. . . loads easily and fits all cartridge type of grease guns. Packed with a multipurpose lubricant, the E-Z Load cartridge lubricates without mess and waste, the maker claims. It promises to be a convenient timesaver in numerous applications on both stationary and rolling equipment.

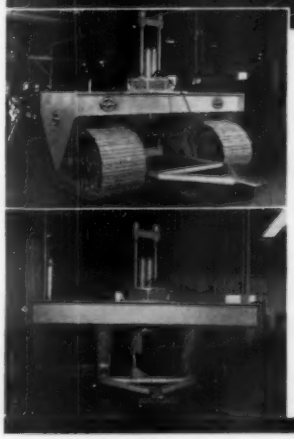
It is packed with Gulflex A, a multipurpose lithium-base grease. The cartridge offers a quick insert-use-discard method of handling to simplify lubrication and to reduce grease loss. Details are given in Bulletin SP-9672. Source: **Gulf Oil Corp., Dept. DM, Gulf Building, Pittsburgh 19.**

JOE STINE
"LIGHTNING"
RIG SKIDDING EQUIPMENT

MAKES RIG MOVING FAST AND EASY

Below, four Stine "Lightning" Rig Skidding Carriages attached to Stine Rig Skidding Beams. There is no lost time or wasted motion with this equipment. Simply insert the two beams, back the carriage into position, and operate a single valve to raise the entire rig. A special hydraulic circuit compensates for irregular weight distribution, allowing the four corners to raise evenly. The two trailing carriages are locked in the straight-ahead position while the two leading carriages are left in the full swivelling position.





A telescoping spacer bar and tongue unit is used to pull the equipment. Carriages are designed to lock in three positions. Upon arrival at the drilling site, the rig is lowered, under full control, by four needle valves. Hydraulic rams are easily removed so that they may be used to re-level the rig should it have settled off plumb.

Write, wire, or phone.

JOE STINE, INC.

6022 Chocolate Bayou Road • Houston 21, Texas
P. O. Box 14471 JA 6-2001

Refinery odors

. . . controlled with two recently announced odor-control chemicals, according to the maker. Called Alamask ABP and its water-dispersible form ABP-X, the chemicals were developed to control petroleum type of malodors from ponds, lagoons, etc.

The maker claims that odors traceable to hydrogen sulfide (below toxic levels or from stacks), mercaptans, amines, phenols, and mixtures are minimized.

Chemical ABP mixes readily with No. 1 fuel oil while ABP-X is easily dispersible in water. Price ranges from about $2.50 per lb. for 1 lb. to $1.00 a lb. for 400 lb. Delivery time: within 5 days. Source: **Rhodia, Inc., 60 East Fifty-sixth Street, New York.**

●

Spreader

. . . for ring-joint flanges is now obtainable. It is a heavy-duty model of the Safety Boy flange spreader. The new Model 104 will handle ASA ring-joint flanges rated at 150 through 1,500 lb. in pipe sizes from 8 through 24 in.

The flange spreader uses pressure from a ratchet handle to force a circular cam wedge between flanges. It offers a fast way to spread pipe flanges and to insert blinds, gaskets, or orifices. Delivery time is immediate. Approximate price, f.o.b. factory, is $125. Source: **Wm. L. Riggs Co., 565 South 127 East Avenue, Tulsa.**

●

Gasoline fires

. . . put out with a new chemical which is introduced through an educator into a water stream. The chemical, Nullifire, puts out fires faster than water fog, carbon dioxide, or mechanical foams, the maker claims.

Another feature cited for the chemical compound is that, for gasoline or fuel-oil fires, it appreciably reduces the hazard of reignition. According to the maker, this is attributed to three factors: (1) the chemical reacts on the water to create a fog of much greater density than that produced by the conventional water-fog nozzle; (2) the chemical emulsifies the surface film of the fuel; and (3) the chemically treated water cools the surrounding metal tanks and surfaces in contact with the fuel. Price: about $3 a gal. Source: **Daniel Chemical Corp., 65 Grove Street, Rockland, Mass.**

●

Refinery acid sludge

. . . made useful with a process recently patented and now available for licensing. Called the Miley process, it converts normally useless acid sludge into valuable products as contrasted with older methods which were designed mainly to dispose of the sludge.

The heart of the process is a retort into which is fed the sludge resulting from treatment of petroleum products with sulfuric acid. The retort produces sulfur dioxide and coke as its main products, along with a variable quantity of gaseous hydrocarbons. These gases can be profitably used as part of the fuel required by the retort. Operation of the retort is largely automatic. One man can supervise the running of up to three retorts because his duties consist of recording temperatures, adjusting sludge feed, and general supervision. Source: **L. Sonneborn Sons, Inc., 300 Park Avenue South, New York 10.**

You've Asked For It...

So—Here It Is!

The rugged new JENSEN COMBINATION JACK. Combines the advantages of both the Beam-Balanced Units and the Rotary Units. Proof, JENSEN keeps up with the needs of oil producers.

For more information drop a card or letter to us at Coffeyville, or better still—ask about the JENSEN COMBINATION JACK at Your Local Supply Store.

Made by JENSEN BROS. MFG. CO., INC., P. O. Box 477-F, Coffeyville, Kansas

Export Office: 250 Park Avenue, New York 17, N. Y.

JENSEN JACKS

HIGH PERFORMANCE at LOW COST

NEW "Varec" Fig. 2000 SERIES VENT VALVE

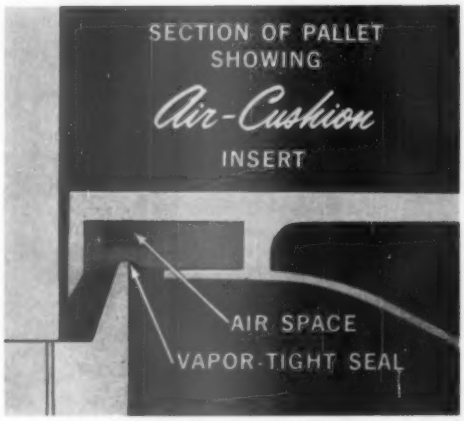


FIG. NO. 2000-81 PRESSURE-VACUUM VENT VALVE

"Varec" has a new Vent Valve with a feature that is going to make contemporary vent valves outdated! It's the unique new "Air Cushion" insert in the pallets.*

The "Air Cushion" forms a perfect air-tight seal with the anodized seat ring. Anodizing prevents corrosion. The insert is made of a special compound of synthetic rubber, which resists freezing. It is flexible yet durable, providing long service with minimum maintenance. Inserts are easily replaced.

A 20% cut in weight makes this new "Varec" Vent safe for mounting on lightest gauge tanks. Installation is made easier and in many cases special rigging is unnecessary.

Increased flow capacity has been developed by a new flared, sturdy, spun-type aluminum hood.

"Blow down" is scientifically controlled, insuring greater vapor conservation than diaphragm type valves.

This "Varec" Fig. 2000 Series Vent Valve incorporates all the latest improvements and refinements in design, yet with all its quality, efficiency and low maintenance expense . . . it costs you less. It will pay you to get full details . . . ask for Catalog Page 2-0.1.

*Pliable solid type rubber inserts only in 2", 3", 4" sizes and high pressure settings.

"Varec"
TRADE ® MARK
JAPAN NO. 539645

THE VAPOR RECOVERY SYSTEMS COMPANY

P-8

© 1960

"VAREC", 2820 NORTH ALAMEDA STREET, COMPTON, CALIFORNIA. *Branches and Representatives in Principal Cities.*

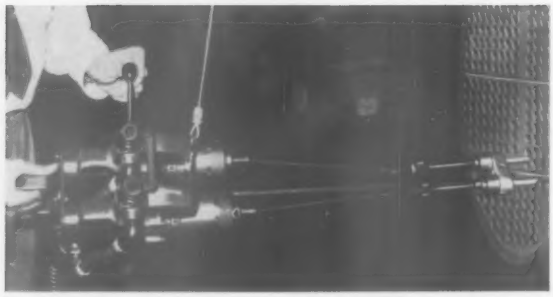
SHOWCASE . . .

New Equipment

Pipes traced

. . . up to 18 ft. deep with an electronic detector recently put into production. The Signalmaster Model TR-1A detector can be used to (1) Locate and trace pipes, cables, and conduit, (2) measure the depth of a line, and (3) pinpoint valves, caps, risers, and junction boxes.

Completely transistorized, the instrument is lightweight and requires only small flashlight batteries for power. The maker claims that a detector of this type pays for itself quickly by the savings effected in elimination of guesswork and costly excavation, as well as repairs to the instrument. Operating weight of the receiver is 4¾ lb. Both the transmitter and receiver use four size C flashlight cells. Delivery time: immediate. List price: about $249. Source: **Goldak Co., 1544 West Glenoaks Boulevard, Glendale 1, Calif.**



Heat-exchanger tubes rolled fast

. . . with a new dual pneumatically operated tube-expansion-control unit with a double spindle design. The Dual Airetrol tool easily rolls up to 30 tubes a minute, depending upon motor speed used. It combines two of the maker's Model 1000 controls into one operating unit.

Tube expansion is automatically controlled by precise measurement of torque output and is accurate to 0.001 in ' finger-tip micrometer adjustment is quickly set to desired torque without using any tools. A calibrated ring permits settings as low as 0.5 lb.-ft. and up to 37 lb.-ft. at 90-psi. air pressure. The tool rolls tubes ranging in size from ½ to 1 in. It operates at 1,500 r.p.m. Delivery time is 1 week and price is about $1,400. Source: **Airetool Mfg. Co., Springfield, Ohio.**

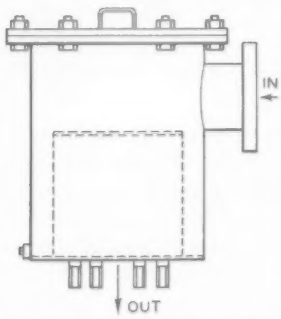
New improved design offers greater convenience, accuracy, repeatability. Simple to operate. Drys and weighs simultaneously. Moisture-loss results in few minutes read directly from calibrated scale. Features new built-in autotransformer and extra deep disposable weighing dishes. Cenco No. 26680 each **$270.00**

cenco

REFINERY SUPPLY CO.
A Subsidiary of Central Scientific Co.
621 East 4th Street • Tulsa 20, Oklahoma
Branches and Warehouses—Mountainside, N. J. Boston • Birmingham • Santa Clara • Los Angeles • Tulsa Houston • Toronto • Montreal • Vancouver • Ottawa

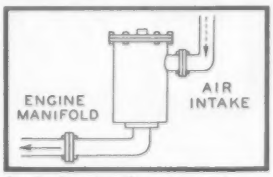
IN-THE-LINE FILTERS

dry-type, oil-wetted and oil bath types

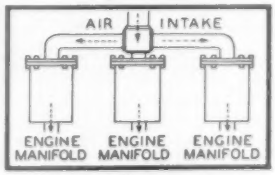


A line of filters for "in-the-line" or "closed circuit" operation is manufactured by The Air-Maze Corporation. Built for efficient filtration of air and gases, these filters are incorporated on remote air intake lines for engines, compressors or industrial heating furnaces. They are used for the filtration of fuel gas to engines; and for filtration of natural gas on transmission or gas processing applications. Cleanable, dry-type units are available for extremely fine filtration, where dust loads are low or where oil must be absent from the gas stream. Oil-wetted and oil bath types available where dirt loads are higher and where continuous low pressure drops are mandatory.

Write for bulletins. The Air-Maze Corporation, Dept. OJ-2, Cleveland 28, Ohio. (Subsidiary of ROCKWELL-STANDARD Corporation)



Intake line for air compressor



Intake systems for multi-unit compressor station

Spare the Chisel · Save the Parts USE KROIL

Don't ruin a valuable piece of equipment merely because some part is rusted tight. Apply Kroil, the amazing new chemical lubricant that creeps into millionth inch spaces (proved by laboratory tests), dissolves rust, supplies necessary lubrication and

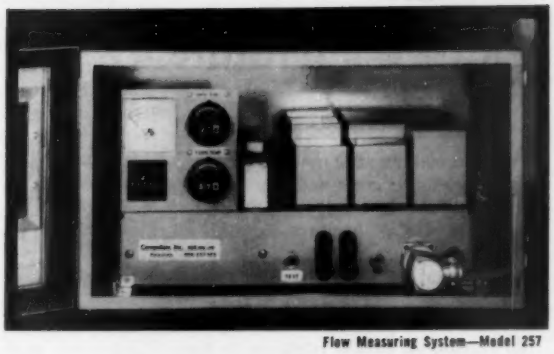
LOOSENS FROZEN PARTS

18,000 of America's leading plants can't be wrong! They have used KROIL for 10 years and are still depending on it to save expensive labor and valuable parts. They say: "Kroil loosened bushings after a 12-ton press had failed" . . . "on repairing heat treat trolleys formerly destroyed every nut. Now Kroil saves them all, and time, too" . . .

You too should be using KROIL every day. Try it on money-back basis. Gallon $4.35; with Kroiler trigger squirt gun (shoots a drop or a stream 15 feet, if desired) $5.25; f. o. b. our factory.

KANO LABORATORIES 1039 Thompson Lane, Nashville 11, Tenn.

KANO LABORATORIES



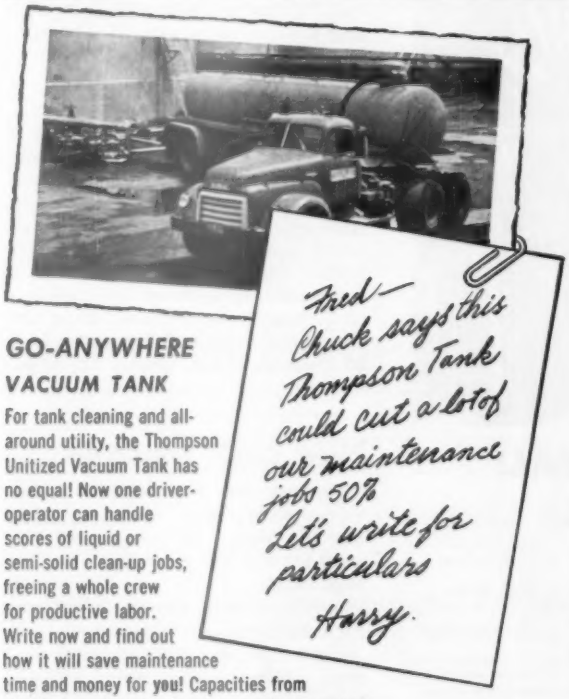
Flow Measuring System—Model 257

MEETS THE DEMAND FOR ACCURATE FLOW MEASUREMENT AND/OR CONTROL

- Gas or liquid
- Steady or intermittent flow
- Wide range
- Direct reading of volumes
- Accessories to make permanent record
- Low installation cost, low operating cost
- Plug-in components

To improve accuracy, to simplify operations, to lower costs, with high performance orifice flow measuring systems, contact

COMPUTERS, INCORPORATED
3407 South Shepherd Drive • Houston 6, Texas



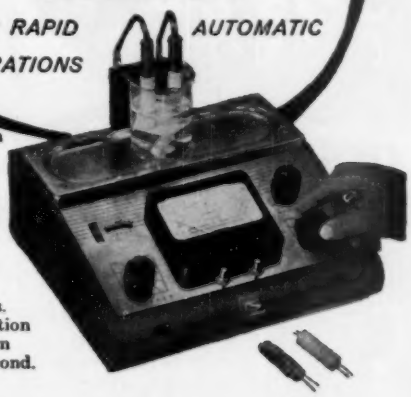
GO-ANYWHERE VACUUM TANK

For tank cleaning and all-around utility, the Thompson Unitized Vacuum Tank has no equal! Now one driver-operator can handle scores of liquid or semi-solid clean-up jobs, freeing a whole crew for productive labor. Write now and find out how it will save maintenance time and money for you! Capacities from 20-100 bbls; skid, truck, semi or trailer mounted.

THOMPSON TANK & MFG. CO., Inc.
2019 East Wardlow Rd., Long Beach 7, Calif.

Sole licensee to Manufacture Vacuum Tanks Under U.S. PATENT NO. 2522077.

CENCO®
COULOMETRIC TITRATOR
FOR RAPID AUTOMATIC TITRATIONS



Measures both mercaptans and olefins accurately . . . automatically Simple to operate. Titrates wide range of concentrations. Registers reaction time directly in tenths of a second.

Write for Bulletin 1264A.

cenco

REFINERY SUPPLY CO.
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SHOWCASE . . .

New Literature

Safety-head assemblies

. . . designed for use with Baker rupture disks are contained in a 4-page bulletin published recently and obtainable now. Highlighted are assembly design and dimensional data. Catalog 459 reports that the safety-head assemblies and precious metal rupture disks, in combination, provide instant, automatic release of excess pressure to high-pressure air lines.

Part numbers, envelope dimensions, and cross-sectional diagrams for 64 different assemblies are offered in the literature. They are available in Taper Seal, Ermeto, high-pressure, and taper-pipe designs, in a range of sizes for straight-through, tees, and cross types. Source: **High Pressure Equipment Co., Inc., Erie, Pa.**

1960 fire-fighting

. . . equipment catalog lists hand-portable extinguishers, stationary fire equipment, piped systems, and large-capacity mobile equipment. Hand-portable extinguishers shown in the 20-page literature cover requirements for Class A, B, and C fires as well as combustile-metal fires. New portable units featured are the Monitor extinguisher and the Sentry Energized series. Source: **Ansul Chemical Co., Marinette, Wis.**

Oil-field equipment

. . . Leaflet R5 spotlights mud tanks and shale shakers in six pages. It contains photos, performance, and construction data, together with different models available. Dimensions and design information are included. Source: **Niagara Screens (Great Britain), Ltd., Straysfield Works, Clay Hill, Enfield, Middlesex, England.**

Electronic-instruments

. . . catalog describes and illustrates instruments for electronic and chemical measurement and control. Specifications and performance data are included for all instruments, including such additions as: a differential electrometer amplifier, a static meter, and a regulated high-voltage supply. The 32-page 1960 catalog contains schematic diagrams and application circuits, as well as basic information on electrometers and micromicroammeters. Source: **Keithley Instruments, Inc., 12415 Euclid Avenue, Cleveland 6.**

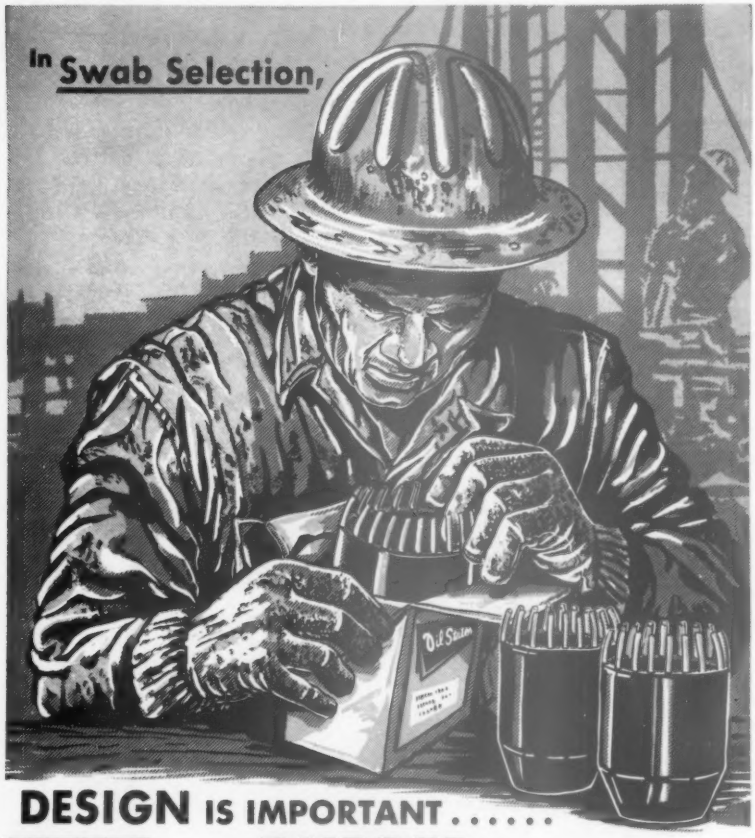
Harbormaster

. . . marine tractors are outlined in a new 2-page condensed catalog which shows installations and features of outboard propulsion and steering units. Harbormasters are a complete marine power and steering package. The literature piece covers details and a comprehensive table of specifications on 17 models ranging from 40 to 500 hp. Source: **Murray & Tregurtha, Inc., 80 Hancock Street, Quincy 71, Mass.**

New color horizons

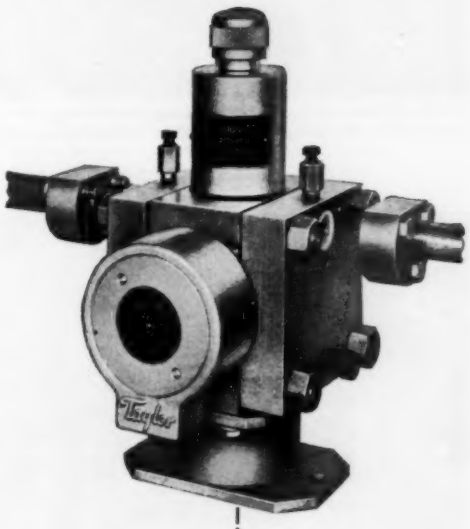
. . . system that stops rust and provides lasting beauty in a system of specially formulated primers and colorful top coatings is featured in a 38-page catalog, yours upon request. A gate-fold spread unveils 67 actual color standards in the new system.

Form 259 also describes other systems which include: water-resistant, heat-resistant, floor coating, heavy-duty chemical-resistant, galvanized-metal coating, wire-fence roller coating, and new speedy-dry system with coatings that dry in less than 30 minutes. The catalog offers 76 full-color


In Swab Selection,
DESIGN IS IMPORTANT . . . . . .
RUBBER IS VITAL!
Efficient Design means trouble-free operation and more fluid lifted per trip . . .
Engineered Rubber means more trips per cup, more fluid per hour.
OIL STATES pioneered the modern swab design . . . was first with the fluted mandrel . . . first with the free-moving cup for easy unloading and positive valving.
OIL STATES Swab Cups contain rubber engineered for oil field use. Compounded for swabbing by oilfield rubber specialists — tops in their field.
The rapid acceptance of the OIL STATES Swab is eloquent testimony to its excellence of design and superior performance. Use OIL STATES on your next swabbing job and be assured of . . . .
"Oil Field Rubber Products Of Matchless Quality."
Oil States
OIL STATES RUBBER CO.
P. O. Drawer 152 • Arlington, Texas
A
B
(A) TUBING and DRILL PIPE SWAB
(B) CASING SWAB

707 means Jet Travel, but...

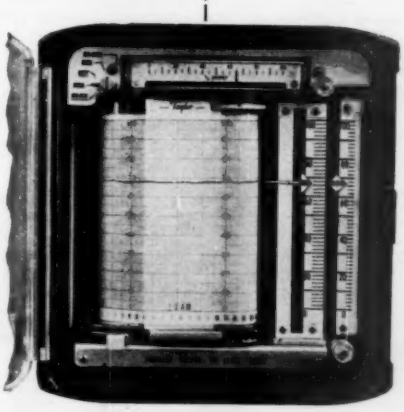
TAYLOR 707T MEANS SIMPLEST, MOST DEPENDABLE FLOW MEASUREMENT



No. 707T Electronic DP Transmitter has no vacuum tubes — no transistors

Users of this instrument claim it is the finest flow transmitter ever designed. It provides the widest possible flexibility, sustained long-term accuracy and performance because:

- **Simplest Conversion** from differential pressure to 0-200mv AC.
- **Nothing exposed to the process** except end plates (steel or 316 stainless steel) and 316 stainless steel diaphragms.
- **Minimum displacement**—only .025 of a cubic inch of fluid for 100" range. Permits DP measurement even when solids are present.
- **Internal silicone damping**—continuously adjustable to damp out pulsations from 5 to 100 cpm.
- **Full over-range protection to 1500 psi**—either high or low sides.
- **Range span continuously adjustable** from 0 to 50" water to 0 to 200" water, using output voltage adjustment.
- **External zero adjustment**, with wide range of zero suppression.



Compatible No. 700J AC or DC Electronic Recorder

- **Powerful servo motor** provides accuracy of ½ of 1%, sensitivity to changes of 0.1% in input signal.
- **High energy servo motor** permits heavy duty, integral alarms.
- **Big 4" chart** gives continuous 30-day record (1" per hr.). "Adjust-O-Matic" 24-hr. chart tear-off, optional.
- **Available with one**, two or three pen recording.
- **Completely transistorized**, unaffected by ±10% line voltage variation.

For full information about these outstanding instruments, call your Taylor Field Engineer, or write for Bulletin 98333 (707T) or Bulletin 98335 (700J). Taylor Instrument Companies, Rochester, N. Y., or Toronto, Ont.

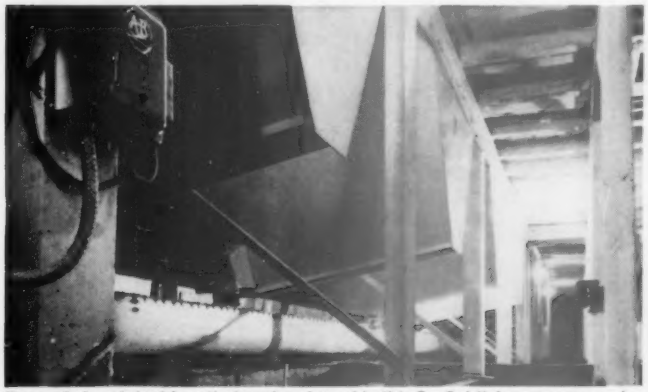
Taylor Instruments **MEAN ACCURACY FIRST**

Fuller Pneumatic Conveying Speed Delivery,

How Bourg Mud & Chemical Transfers

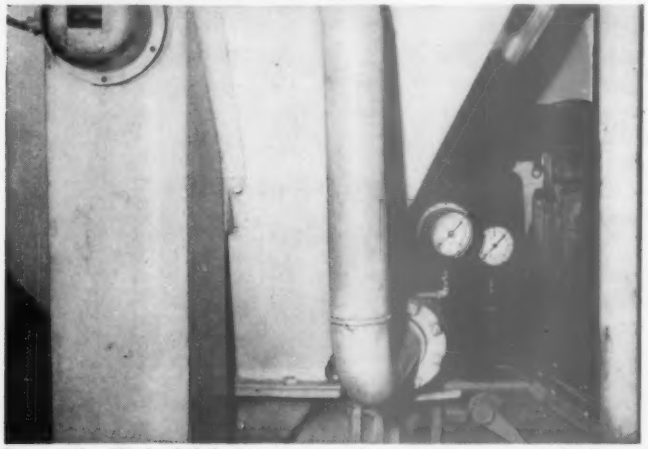
"C.T. 8" mud-delivery barge alongside drilling rig tender. Fast, pneumatic deliveries in high seas are made without danger to crews or equipment.

Superstructure of self-propelled drilling mud delivery barge, the "C.T. 8". Flexible hose, through which mud is pumped to rig storage bins at 50 tons an hour, rests atop enclosed Airslide bins. Pneumatic, bulk delivery system replaces cargo net, labor crew, costly bag handling.

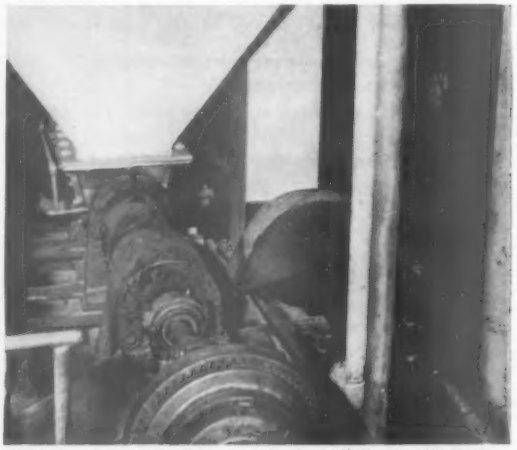


Four of the eight bins discharging into Airslide® fluidizing conveyors in hold of "C.T. 8". These are discharged individually into a screw conveyor, as part of high-speed, automatic mud-delivery system.

Opening discharge gate at Airslide bin outlet, sending flow of dry drilling mud into screw conveyor.



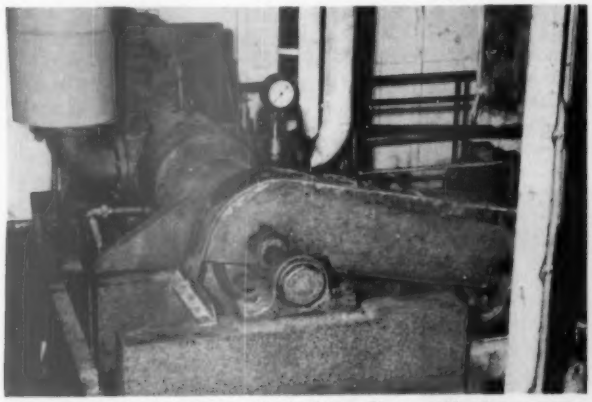
Pneumatic "Fluid Lift" elevates mud from screw conveyor discharge point into a receiving hopper—from which mud is pumped aboard rig.



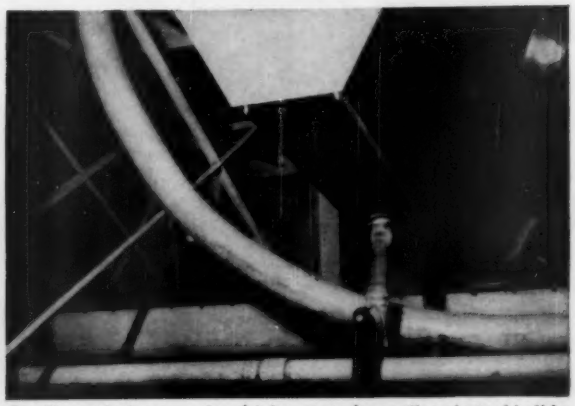
Bottom of receiving hopper, showing 6" Type "H" Fuller-Kinyon pump for pneumatically conveying barite. (Drive clutch in foreground.)

Systems for Drilling Mud Cut Labor Costs

50 Tons an Hour In Two-Man Operation



Rugged, trouble-free Fuller Single-Stage Rotary Air Compressor, located amidships, supplies all air for pneumatic conveying operations.



Small, vertical connection (right, center) supplies air to Airslide fluidizing conveyor along bottom of receiving hopper. This unit causes mud to flow by gravity into Fuller-Kinyon pump.

Mud-storage terminal adjoins dock. Fuller pneumatic conveying systems automatically move mud to weighing scale and then to either bulk cans or into bins of "C.T. 8" delivery barge. On both offshore and land-based rigs handling mud or cement, Fuller equipment offers time-tested advantages.

The Fuller Rotary Compressor—widely known in the petroleum industry for a variety of in-plant and gas-gathering applications. Advantages of the rotary include pulse-free compression, absence of vibration, low-power needs and reduction of maintenance. Available in capacities to 3300 cfm.

1321
G-205T

FULLER COMPANY
GENERAL AMERICAN
TRADE MARK

FULLER COMPANY
132 Bridge St., Catasauqua, Pa.
SUBSIDIARY OF GENERAL AMERICAN TRANSPORTATION CORPORATION
Offices in Principal Cities Throughout the World

Fuller
pioneers in harnessing AIR

application photos and 110 color chips to show actual colors at a glance.

Special technical-data section features complete information on surface preparation, types of surfaces, application techniques, how to estimate gallonage needed for various sizes and shapes, glossary of terms, mixing, thinning, and drying information. Source: **Rust - Oleum Corp., 2799 Oakton Street, Evanston, Ill.**

Service-stations

. . . products listed in Catalog SS range from automatic nozzles to vertical check valves, including leak detectors, hose swivels, tight-fill equipment, and many others. The 24-page catalog notes all sizes of each product together with construction details and operating conditions. Source: **OPW Corp., 2735 Colerain Avenue, Cincinnati 25.**

Water-tube

. . . steam generators known as Models VL and VLP are illustrated in a new 20-page publication—Catalog SB-57R. Both generator types feature integral water-cooled furnaces and are fully described with section views, dimensional drawings, and mechanical data. Included are lists of typical users and descriptions of firing equipment. Source: **Erie City Iron Works, Erie, Pa.**

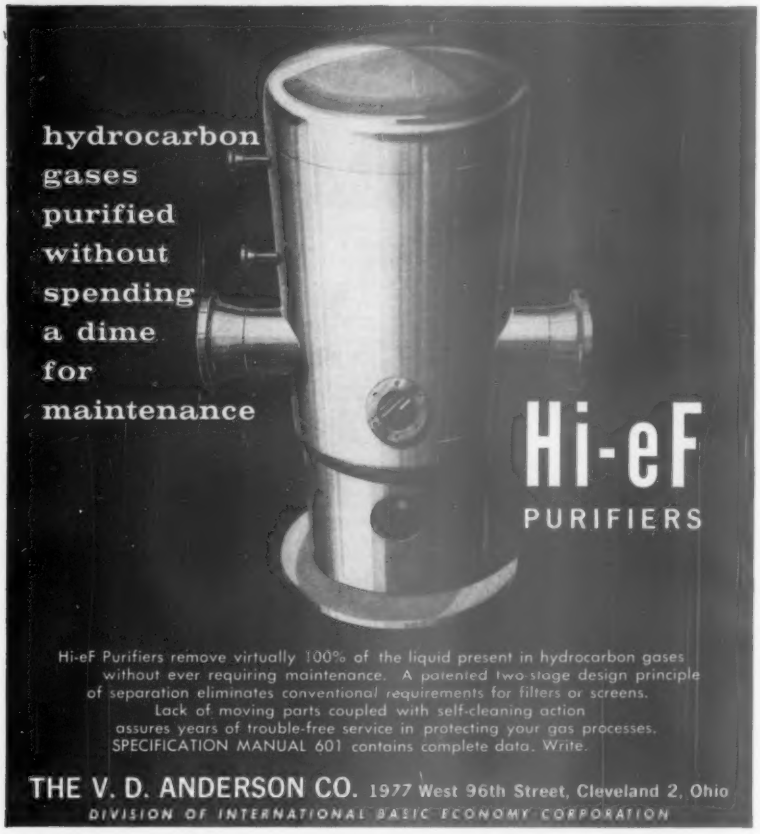
Analog computers

. . . and accessories are outlined in a new 4-page brochure just issued. It contains descriptions and specifications of: (1) the MC-5800 Precision Master analog computer (80 operational amplifiers); (2) Model MC-5900 Process Master analog computer (120 operational amplifiers); (3) electronic multiplier; (4) XY data-plotting boards; and (5) linear-programing computers. The literature also describes the Dystac system which incorporates the iterative capability of digital computers while maintaining the speed and ease of use of analog devices. Source **Computer Systems, Inc., 611 Broadway, New York 12.**

Two rod pumps

. . . designated Texas Stripper and Corsicana Special, designed to handle scale, paraffin, sand, and well trash are described in a new bulletin. According to the literature, the Texas Stripper is designed to prevent the pump from sanding up when the well is shut down. The discharge ports in the barrel tube are enclosed by a long, outer jacket tube made up on the rod coupling which reciprocates with the pull tube and plunger.

The Corsicana Special operates with 1-in. pipe or hollow sucker rods instead of conventional solid rods. The pump is equipped with stroke-through extensions on either end of the barrel tube to keep foreign matter from damaging the working surfaces of the parts. It's recommended especially for use in shallow wells. Source: **Harbison-Fischer Mfg. Co., P. O. Box 127, Fort Worth.**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DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION

▶▶▶ Equipment Men Notes

Two field representatives named

. . . by W. R. (Bert) Wheeler, vice president in charge of sales at American Iron & Machine Works Co., Inc., of Oklahoma City. Charlie Traweek takes over in the South Louisiana district and is working out of Houma, La. Jack Neff has charge of the Farmington, N. M. area.

Victor M. Hajovsky is elected

. . . to the board of directors of Plastic Applicators, Inc. Hajovsky is vice president in charge of Houston operations for the firm which provides baked-on plastic coatings. He has spent 10 years working in this field.

J&L Supply Division makes

. . . several new assignments to further expand the division's drilling-equipment field sales force, reports W. L. Wolfe, vice president-sales.

F. A. Street

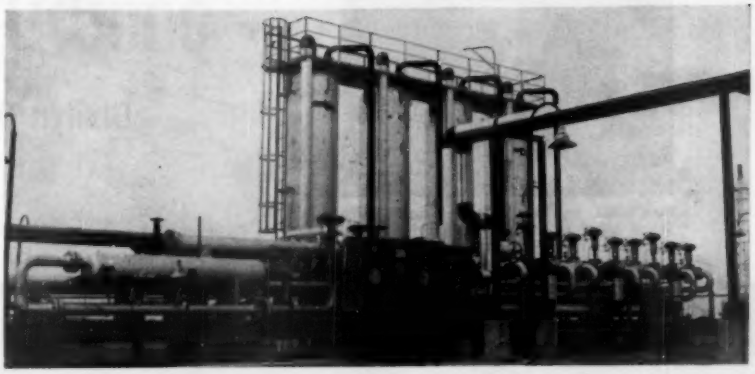
Newly appointed regional salesmen include: G. A. Whiteker, Rocky Mountain, with headquarters at Denver; N. W. Babb, Gulf Coast, operating from New Orleans; and S. L. Easley, Southwest, locating at Midland, Tex.

A pair of special representatives for drilling equipment have also been appointed. M. G. Burgeis has been

G. A. Whiteker N. W. Babb

transferred from Midland to Jones & Laughlin's Dallas sales office. His territory will include North Texas, East Texas, North Louisiana districts, and the Dallas, Fort Worth, and Shreveport sales offices. F. A. Street has been assigned to cover the Oklahoma and Kansas districts and the Tulsa, Oklahoma City, and Wichita sales offices. He will locate in Tulsa.

Meanwhile, H. L. Shackelford, salesman at Odessa, has been named to the staff at J&L's Denver sales office.



Four-tower Dry-Frac quick-cycle hydrocarbon-recovery unit

. . . manufactured by Black, Sivalls & Bryson, Inc., has been placed on stream by Lone Star Producing Co. near San Antonio. This is an adsorption-type unit specifically designed to process 50 million s.c.f. of natural gas a day at 1,000 psi. design operating pressure. Estimated hydrocarbon recovery is more than 200 bbl. a day.

A modern adaptation of the BS&B dry-desiccant dehydrator, application of the process is primarily for hydrocarbon recovery rather than dehydration alone. The four adsorption towers were fabricated and shipped separately for erection on concrete foundation pads located adjacent to the switching level skid.

The basic system—Dry-Frac towers, heaters, and skids—were fabricated by the BS&B Oil Field Division plant in Oklahoma City. Controls were fabricated in the company's controls plant in Tulsa. Field hook-up was done by Lone Star with technical assistance from BS&B.

S. L. Easley M. G. Burgeis

Hamilton-Thomas Corp. buys

. . . controlling interest in Griscom-Russell Co., a subsidiary of General Precision, Inc., according to a joint announcement by Lee G. L. Thomas, president of Hamilton-Thomas, and James W. Murray, chairman of General Precision Equipment Corp.

Griscom-Russell, located in Massillon, Ohio, manufactures heat exchangers. General Precision, Inc., a subsidiary of General Precision Equipment Corp., will receive in the transaction 16% of the common stock and 30,000 shares of 5% preferred stock of Hamilton-Thomas.

C. E. Van Loozen is promoted

. . . to manager of Mission Mfg. Co.'s newly created western district, which encompasses California and Canada. The announcement comes from T. R. Fullinwider, domestic sales manager, at a district managers' meeting held recently in Houston. Van Loozen, who most recently served as special sales representative in Los Angeles, has been with the company since 1956.

C. E. Van Loozen

Republic Supply Co. opens store

. . . at Carrizo Springs in Southwest Texas, announces C. J. Jump, general sales manager of the Oklahoma City concern. Store manager will be Joe S. White who previously served at Republic's Alice, Tex. store. His last assignment at Alice was as field sales representative. E. D. Abbott, Jr., former assistant store manager at Rule, Tex., will be White's assistant.

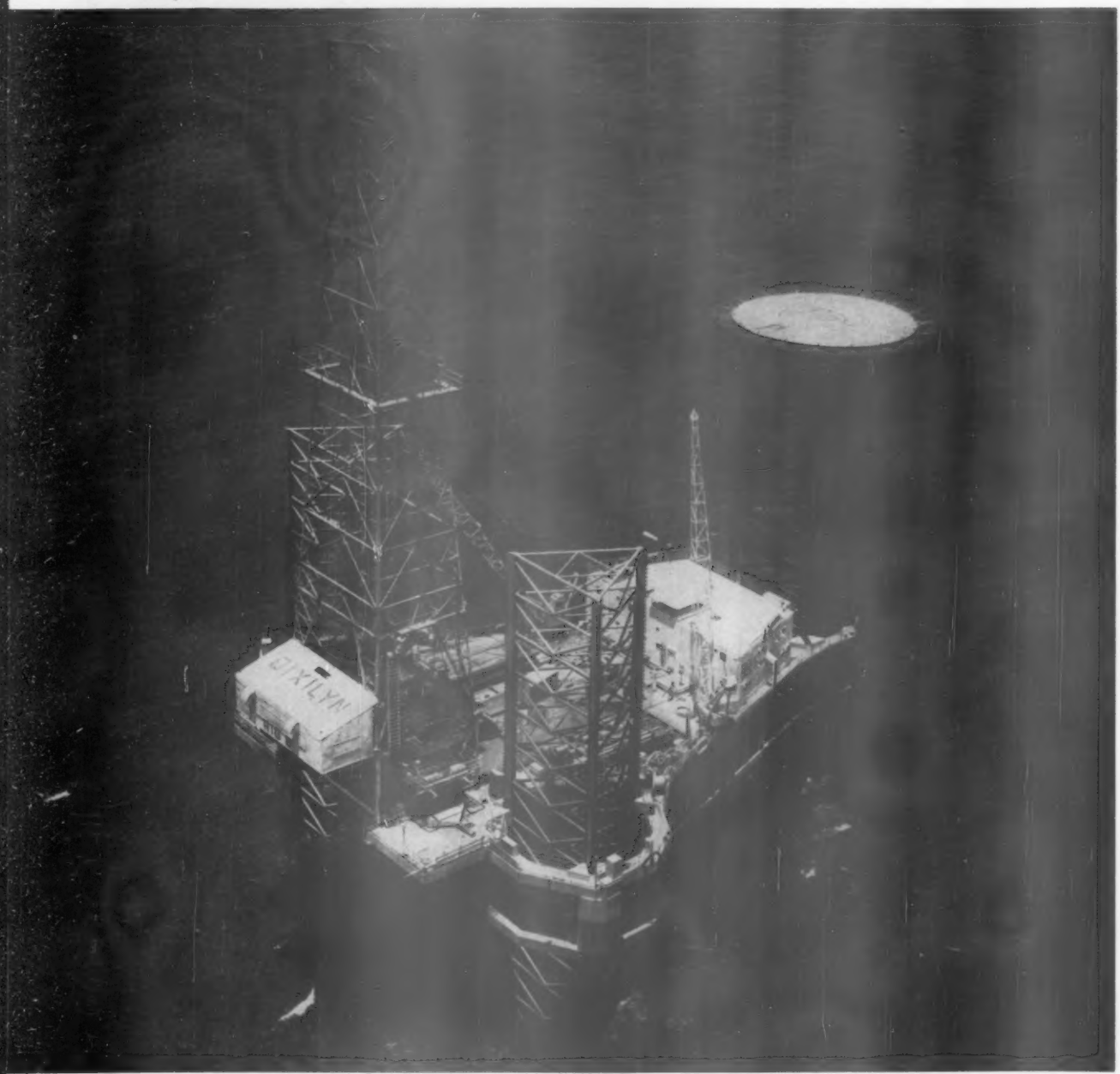
Lane-Wells Co. opens two

. . . new technical oil-field-service locations. A station at Albion, Mich., under the supervision of R. D. John-

Draw works showing Tiger Brand Wire Rope after 14 months of service. Only the best wire rope was good enough for this job.

50 miles offshore

Dixilyn Drilling uses USS Tiger Brand—



50 miles offshore the "Julie Ann" is drilling in the Vermillion area southwest of New Orleans. The million-pound derrick is rigged with Tiger Brand Wire Rope to assure long, trouble-free service.

and east of the Pecos—

America's No. 1 Wire Rope

East of the Pecos River, Dixilyn Rig No. 3 drilling near Odessa, Texas, Upton County. The 7,500 feet of Tiger Brand 1¼" Drilling line being used on this well had already drilled three wells without trouble. The tool pusher, Mr. J. B. Booth, is very satisfied with the service he gets from USS Tiger Brand drilling lines.

The "Julie Ann" is the newest offshore drilling platform of Dixilyn Drilling Corporation, New Orleans. It can drill in water over 100 feet deep—to drilling depths in excess of 25,000 feet. It is the first LeTourneau drilling platform designed to include 175-foot legs. The million-pound, two-well derrick is mounted to permit the drilling of six wells from the same platform location.

Dixilyn operates a total of seven rigs—all are equipped with USS Tiger Brand Wire Rope. Mr. Russel V. Tidwell, General Manager, says, "We use Tiger Brand because it gives us better service than any other rope we ever tried. We watch our ton-mile records and Tiger Brand has definitely reduced our wire rope costs."

The "Julie Ann" is rigged with 5,000 feet of 1½-inch Tiger Brand Monitor Excellay Preformed Rotary Drilling Line. The rope had been in service 14 months when the photographs were taken and it was still in excellent condition.

For complete information about Tiger Brand Wire Rope for oilfield use, write for our catalog, American Steel & Wire, Dept. 0124, 614 Superior Ave., N.W., Cleveland 13, Ohio.

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1. It is made by a company that maintains the most complete research and manufacturing facilities in the steel industry.
2. It is designed by one of the country's most capable staffs of wire rope engineers. It is serviced by thoroughly experienced field representatives always ready with their assistance.
3. Every type of Tiger Brand Wire Rope is designed for specific applications. *You* get the *right* rope for the job.
4. It is made by *one* company, U.S. Steel, and every step of production from ore to finished product is carefully controlled and supervised to guarantee *one* high standard of quality.
5. Tiger Brand Wire Rope is manufactured by the foremost single wire rope producer in the country.

American Steel & Wire Division of United States Steel

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors, United States Steel Export Company, Distributors Abroad

son, will offer to the Great Lakes area the company's newest developments in perforating, nuclear logging, Vibro-Frac, packers, and bridging plugs. Johnson previously was with the company at Ponca City, Okla.

The other station, at Liberal, Kans., will be under the direction of J. B. Russell, field-service operating engineer in charge. This station will offer Lane-Wells' developments in electrical logging, nuclear logging, perforating, Vibro-Frac, packers, and bridging plugs throughout the Southwest Kansas area.

Louis W. Mason assumes title

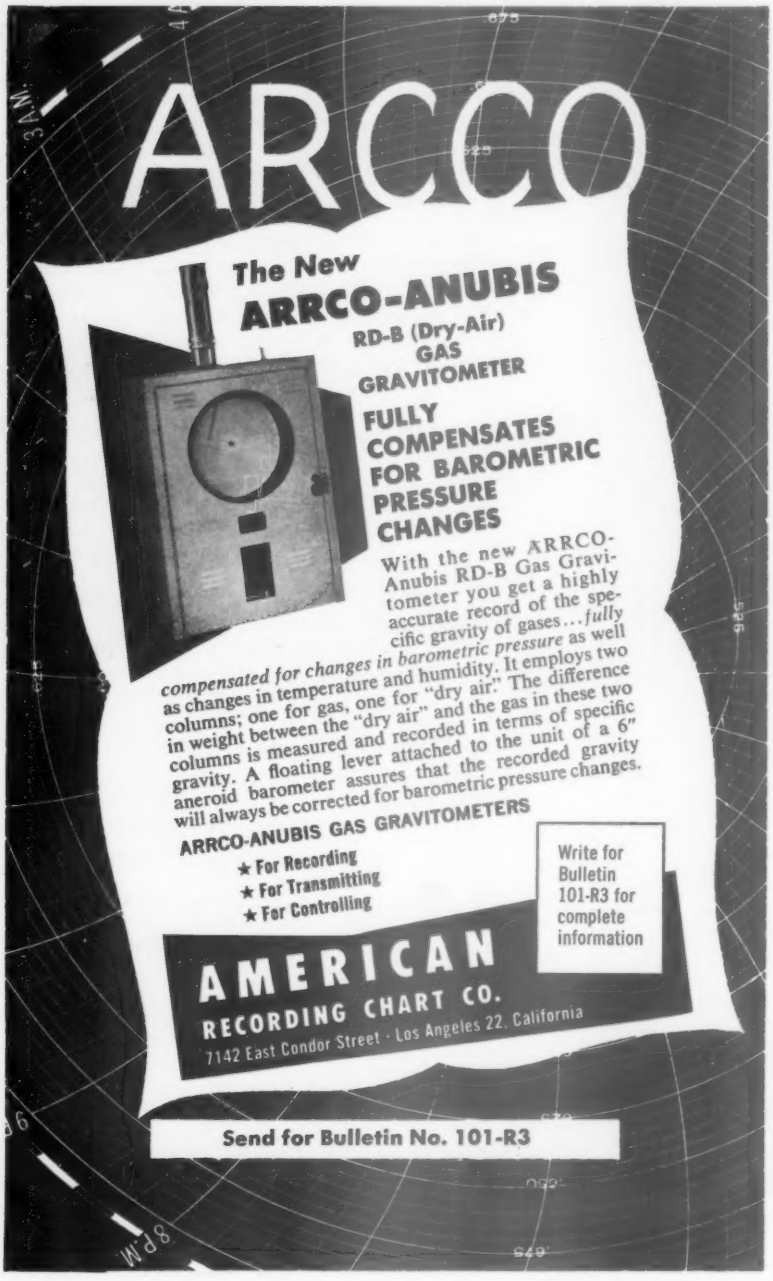
L. W. Mason

. . . of general sales manager of U. S. Steel Corp.'s National Tube Division, succeeding Robert E. Williams who recently became vice president of sales.

Mason became a buyer in National Tube's Pittsburgh purchasing department in 1923. He was named assistant purchasing agent in 1930. In 1942 he was appointed manager of purchases of Tubular Alloy Steel Corp. at Gary, Inc., a National Tube subsidiary.

Mason entered the sales field in 1944 when he was appointed assistant to the general sales manager in the firm's Washington, D. C., offices. Two years later he was moved to Detroit as district sales manager, and in 1946 was transferred to Pittsburgh in the same capacity.

He was appointed assistant to the division's general sales manager in Pittsburgh in 1948, then was moved to Chicago 2 years later as central area sales manager. He stayed in Chicago nearly 9 years before moving to New York last year as eastern area sales manager.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FOR BAROMETRIC
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With the new ARRCO-Anubis RD-B Gas Gravitometer you get a highly accurate record of the specific gravity of gases... *fully compensated for changes in barometric pressure* as well as changes in temperature and humidity. It employs two columns; one for gas, one for "dry air." The difference in weight between the "dry air" and the gas in these two columns is measured and recorded in terms of specific gravity. A floating lever attached to the unit of a 6" aneroid barometer assures that the recorded gravity will always be corrected for barometric pressure changes.
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Send for Bulletin No. 101-R3

J. F. Powers, Jr. is vice prexy

. . . and sales manager of Chiksan Co. He will move from the company's eastern office in Newark to Brea, Calif., site of Chiksan's headquarters. A subsidiary of Food Machinery & Chemical Corp., Chiksan manufactures swivel joints, tank car and truck loading arms, and marine barge and tanker loading systems.

David M. Salls is appointed

. . . product sales manager for Cooper-Bessemer Corp.'s RT-248 gas turbine. Salls first joined C-B in 1941. In 1947 he became associated with Texas Eastern Transmission Corp., and returned to Cooper-Bessemer in 1951. His efforts have been concentrated on all phases of gas-industry power and compression needs.

Orville F. Bricker assumes post

. . . of advertising manager of Elliott Co., succeeding Charles W. Kalbfus who retired. Bricker has been in ad-

O. F. Bricker

C. W. Kalbfus

vertising and sales with Elliott since 1943. He has 35 years of experience in industrial advertising, sales, and

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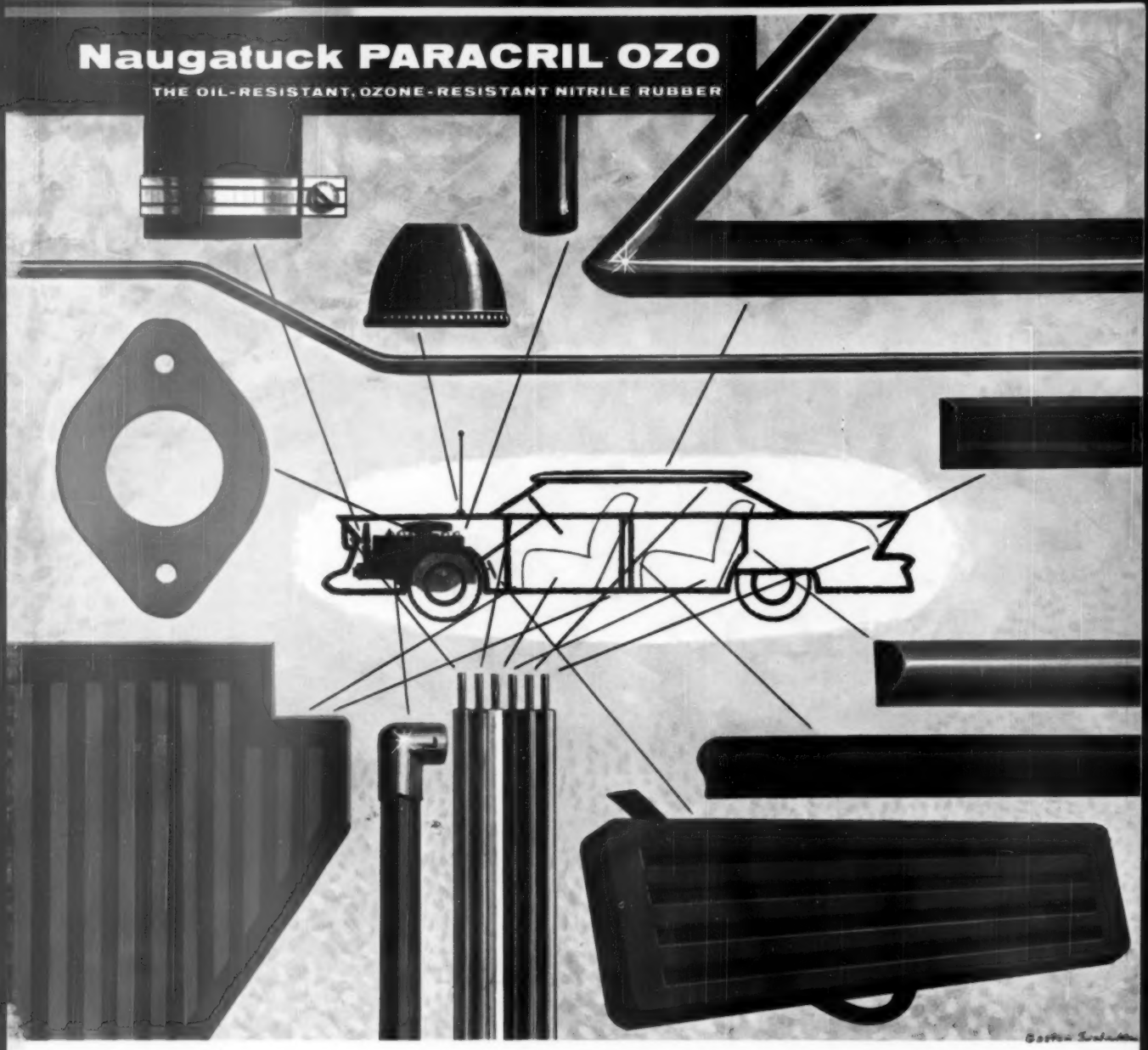

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Rollers are crowned to prevent end-loading and the resultant spalling of races. Directional trueness is maintained by retainers of standard bronze or "Rollube" ferrous alloy of one piece or two piece construction.

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public-relations work in the electrical and power-equipment field.

Kalbfus worked for the Jeannette, Pa. firm for 44 years, spending 39 years as ad manager. He was employed by Lagonda Mfg. Co., Springfield, Ohio, in 1915, and soon took over the company's advertising responsibilities. Soon thereafter, Lagonda was purchased by Elliott and Kaubfus was transferred to Jeannette.

James Zenner named manager

. . . of the Houston office of Grove Valve & Regulator Co., of Oakland. He will act as liaison between Grove's southwestern field force and the company's home office. Zenner formerly was in charge of warehousing, purchasing, and field-material control for Gulf Oil Corp., in Buras, La. Before that he was an offshore district purchasing supervisor in Morgan City, La., and still earlier, was stationed in Pierce Junction and Houston as a warehouseman and purchaser of oil-tool equipment.

Dowell organizes sales group

. . . which will handle a growing list of specialty products, according to R. H. Smith, sales director for Dowell Division of The Dow Chemical Co. Headquarters for the new organization will be in the company's general offices in Tulsa under the managership of H. E. (Bud) McNeill (pictured at right).

McNeill joined Dowell early in 1951 as a junior service engineer at Houma, La. Following a short period at Natchez, Miss., he became station manager at Lafayette. In 1954 he was promoted to area engineer at Alice, Tex., before being made product sales manager at Tulsa last year.

Division engineer for the new group will be Parke D. Muir (shown at left). He joined Dowell 14 years ago as a research chemist at Tulsa. Muir was transferred to the technical service and development department in 1953 and became a group leader in the Dowell Research Laboratories 2 years ago.

NEW
FROM HAPPY . . .
. . . the solution to the paraffin problem in flowing well tubing: a unique paraffin knife with opposite rotating spiral blades. Going down, the blades rotate in one direction — and in the opposite returning — so it is impossible for the tool to "track" and pack paraffin against the tubing wall. Paraffin grains are then suspended in the fluid for free flowout.
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SEVEN-TON UNIT is delivered to Miami for overhaul after arrival from Venezuela.

Air cargo moves big loads at fast speeds for remote drillers

THE JET AGE has arrived for world travelers, but perhaps more significant to contractors and operators with overseas ventures are the vast fleets of cargo liners available for rapid transport of vital equipment.

In the news recently have been an increasing number of air lift operations. Entire rigs, or other installations, have been flown into the jungles, or to remote desert sites.

Crucial components of equipment can be replaced or overhauled in a few days via air routes as compared to weeks or months by surface freight. Bigger loads at faster speeds is the trend for today's air cargo.

An example of bigger loads is seen in the photo above. The electrical field section of a gas turbine generator used in the Venezuela operations of Creole Petroleum Co., arrived in Miami for overhaul—almost the entire load of a Pan American Cargo Clipper.

The unit weighs 14,510 lb. It was consigned to the manufacturer, General Electric Co. at its Hialeah Plant, where the unit will be surveyed to determine where the reconditioning work will be done.

Machinery movers unloaded the cargo clipper with a mobile derrick. It was the largest single piece of air cargo ever received at Pan American's Miami terminal.

Dry weather spurs gas hunt

END OF THE RAINY SEASON will bring a new flurry of drilling activity to the Sacramento Valley and northern California gas areas. Interest will focus on two trends. One, from Red Bluff in the north to Vernalis in the south, will see more ventures searching for gas. The other is a 16-mile strip in Colusa and Sutter counties northwest of Sacramento. In this local, two strikes have been made earlier last month which should prompt development.

Western Gulf Oil Co. 1 F. J. Strain is credited with discovering the Buckeye field 6 miles southeast of the Arbuckle field. The Strain is considered a significant well and though unconfirmed, it is believed that it was completed from 8,468-87 ft. in the Cretaceous-F zone.

Cameron Oil Co. 1 Armstrong drilled a discovery test opening the Grimes gas field about 7 miles northeast of the Western Gulf 1 Strain. The total depth of the Armstrong was 7,528 ft. and it is considered to have been completed in the Cretaceous-F zone sand, also.

The Marysville Buttes gas field lies 10 miles north-northeast of the Cameron well and it is possible that both it and the Strain well may conceivably link with Marysville Buttes produc-

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or the hazard of
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drill pipe and casing

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92 FLAKE GRAPHITE

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- minimum graphitic carbon 92%
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To begin with, Magcobar technology itself is more than money can buy. It gives you an extra assurance of success. Magcobar technology allows you to take advantage of every cost cutting opportunity. It helps you to drill better, more profitable wells. But, more than that, Magcobar technology helps let you plan right from the start. The Magcobar **planned mud program** keeps the over-all cost of drilling down. And Magcobar can base this planning on its broad experience, the quality of its products, and the skill of its mud engineers. It's all to your advantage! Wherever in the world you are drilling, begin now to plan with Magcobar for your next wells. You can be confident of cutting high drilling costs and of a **well done** with Magcobar technology.

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tion. This would prove to be extensive gas reserve if a relationship exists.

The general area has provided some speculative interest that a common source is present for the three sectors and this is evidenced by a heavy lease play in the area.

Nifty sixty program in Denver basin

A 60-WELL PROGRAM is proposed by the B. F. Allison Drilling Co., Denver, in the Denver basin during the coming year.

The first 10 wells are scheduled to start within the next 30 days. Plans call for tests in Logan, Morgan, and Washington counties, Colorado, and in Banner, Cheyenne, and Kimball counties, Nebraska.

Second platform contracted

WORK WILL COMMENCE on a second offshore platform following the awarding of a contract to Yuba Consolidated Industries of San Francisco. Upon completion, the drilling platform will be used by Standard Oil Co. of California, Western Operations, Inc., in southern California off the coast of Santa Barbara County near Summerland.

It will be towed to the offshore state leases in May and will stand in water 106 ft. deep, about 1¾ miles from the existing Summerland platform. Drilling is expected to begin in late summer. Estimated cost for the unit is approximately $750,000.

Slim-hole completions popular in California

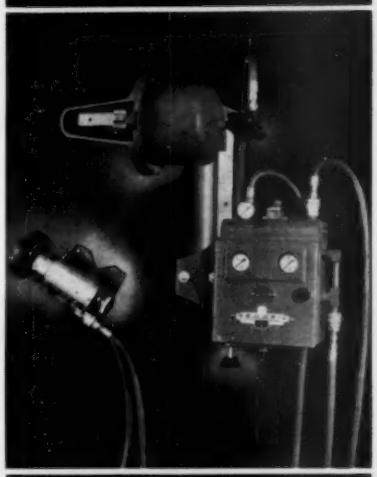
ANOTHER OPERATOR joins the group which is interested in learning how economical slim-hole completions really are—by trying one for size.

In this case, Pacific Central Co. cemented 3-in. pipe at 1,822 ft. in its 1 SLF well, after reaching a total depth of 2,022 ft. This development of shallow gas sands is 3½ miles north of the Trico gas field near the Tulare-Kings County line in Central California.

Bakersfield Drilling Co. is the contractor for the well which is near Pacific Central's 1 Roller, a test that has been idle since last August at a total depth of 2,116 ft.

Several operators have used slim-hole completions in this area, using from 3-in. pipe down to 2-in. tubing for the production string.

The NEW GEODRIL® AUTOMATIC DRILLER



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1. LONGER BIT LIFE
2. FEWER TRIPS
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The GEODRIL Automatic Drilling Control was developed, tested and proved in the field by The Geograph Company, manufacturers of the internationally accepted Geograph Mechanical Well Logging Recorder.

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Service for the GEODRIL Control is provided by the experienced personnel of Geograph Oil Field Services. Their reputation for service is backed by over a fifth-of-a-century of experience in the oil fields.

When you drill your next well, specify the NEW GEODRIL Automatic Driller for maximum drilling efficiency. For additional information, contact your nearby Geograph Oil Field Services office.

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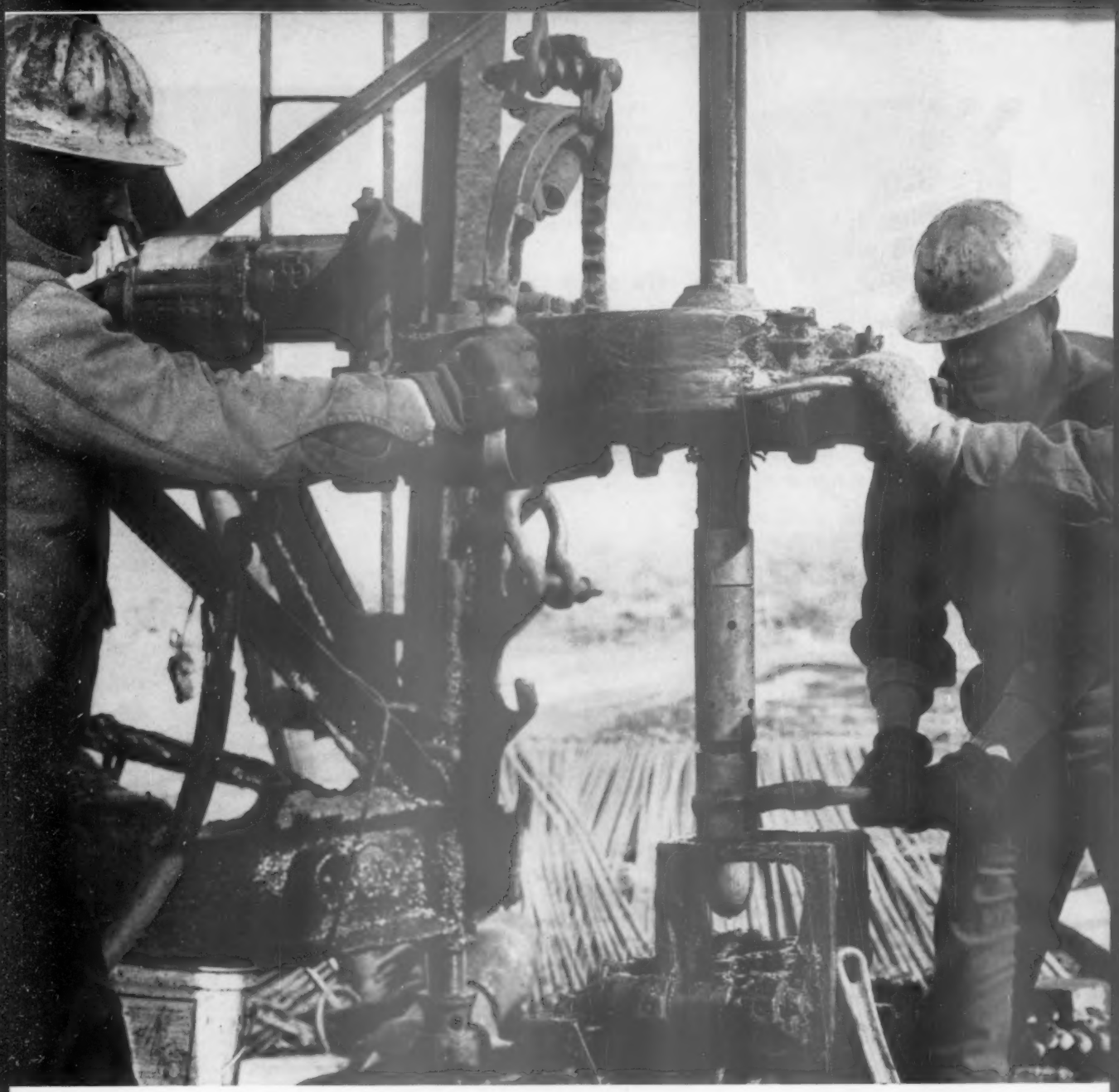

ABRASIJET--A NEW KIND OF SERVICE THAT HELPS YOU

MAKE POOR WELLS GOOD AND GOOD WELLS BETTER

Abrasijet* is a new Dowell-developed formation cleaning and perforating service. It uses high-velocity streams of fluid and abrasive particles, usually sand (pumped through small jet orifices in the tool pictured above) to perforate casing or cut through well bore damage. Water, oil, acid and mud have been used as the sand-carrying fluid.

Reports from field after field show that Abrasijet gives better results than more conventional treatments in many instances. These same reports also show that Abrasijet has been successful in cases where all other treatments failed. Here are a few examples:

IN SOUTH TEXAS. Abrasijet was used to re-perforate a Wilcox well and penetrate beyond gyp deposited near the well bore. Production had dropped to 10 bopd on gas lift. Five sets of two perforations per level were jetted using Dowell inhibited acid and sand. *Production rose to 96 bopd with 880 psi flowing pressure.*

IN NORTHWESTERN NEW MEXICO. *Abrasijet was used to complete a 260 bopd flowing well in an area surrounded by dry holes.* Completion was into a 22-foot section of the Dakota. Abrasijet was employed to make 48 perforations in twelve settings of a four-jet tool. Well was also fractured in the basic eight-hour pump-rental time.

NEW IDEAS FROM DOWELL

TO HELP YOU MAKE MORE PROFIT

"ACID GUIDE"*

This new companion to the "Frac Guide"* is used by Dowell for *better* engineering of acid treatments. Results have been greater production increases, lower treatment costs, or both. Probable results of acid treatments can be predicted, and the most promising treatment selected for a given well.

CORROSION INHIBITOR SQUEEZE

This Dowell-developed technique for inhibiting corrosion in oil wells has given excellent long-term protection with minimum cost of application. Second and later applications of Corban* inhibitor by "squeezing" it into the producing formation have been even more efficient than the first.

FOAMING AGENT FOR WATER REMOVAL

This new Dowell addition agent can be added to water used in fracturing to induce foaming and reduce swabbing time. It is also used to facilitate air or gas drilling through low-production water zones. For air drilling, it minimizes "balling" of cuttings and creates a foam for easier water removal.

IN SASKATCHEWAN, CANADA. *A well was successfully perforated with Abrasijet after two attempts at explosive perforating had failed.* 4½-inch casing had been cemented through the Mississippian pay from 2318 to 2323 feet. Four perforations were made followed by a frac job. *One month later production was averaging 70 to 80 bopd in a field where most wells average only 50 to 60 bopd.*

IN CENTRAL KANSAS. *A well that produced only water on initial completion was recompleted successfully with Abrasijet.* A radioactive survey showed a channel from initial perforations at about 3318 feet to bottom of casing at 3405 feet. Well was squeezed with cement to shut off water. Abrasijet was used to reperforate without shattering cement. New perforations were from 3323 to 3329 feet. *After acidizing, well tested 6.5 boph with only a trace of water.*

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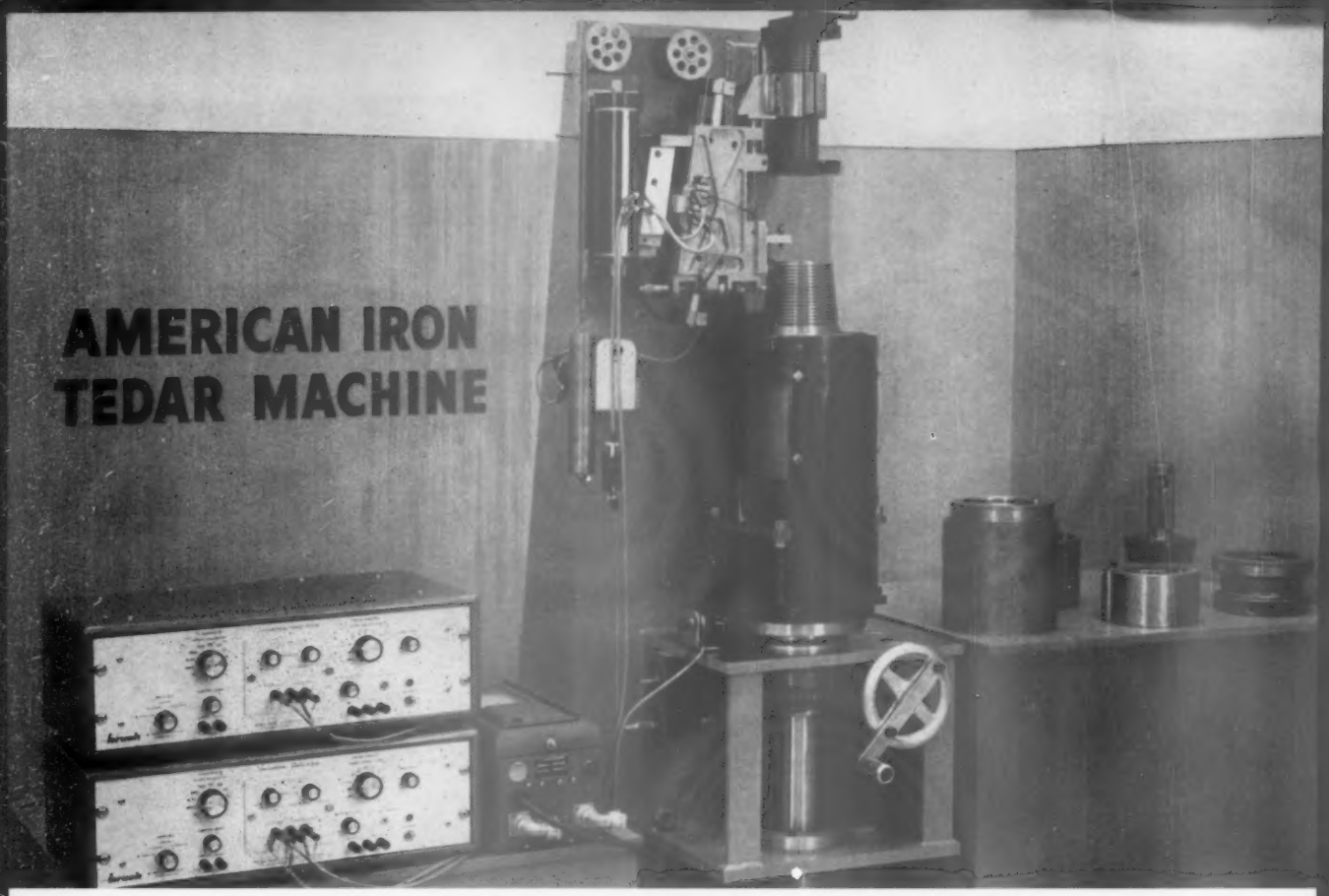

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SIXTH SALT DOME in East Texas' Tyler salt basin was brought into production with the rediscovery of oil on Concord dome, Anderson County. The structure had been abandoned for 17 years.

Sixth "dry" dome yields oil in East Texas

By FRANK J. GARDNER

CHAPTER 7 in the checkered history of the Tyler salt basin of East Texas has just been penned in northern Anderson County. The leading character, in a comeback role, is the old Concord piercement salt dome, hero of Chapter 2.

A Dallas independent, E. O. Meadows, has completed his 1 Concord Baptist Church as a new oil strike on the southeastern flank of Concord dome; initial pumping potential is 345 bbl. daily of 12.1° oil from Woodbine sand at 4,404-32 ft. Gas-oil ratio is only 29 to 1. Total depth of the discovery is 4,556 ft.

Thus East Texas now has its sixth productive salt dome, out of the 18 that prior to 1956 were written off as "hopeless prospects."

Waves of optimism . . . Chapter 1 of this story began in 1927, when Humble Oil & Refining Co. found oil at Boggy Creek dome on the Anderson-Cherokee county line. The discovery set off an early salt-dome era for East Texas, and interest was high in these prospects for about 5 years. But consistent failure dogged drilling operations on them, and by 1932 they were tabbed as "barren domes." Boggy Creek, meanwhile, continued to produce a small amount of oil, and even today is yielding about 80 bbl. daily from eight wells.

In 1942, Concord dome (scene of this week's strike) was brought into production, and Chapter 2 of the salt-dome search was inaugurated. Magnolia Petroleum Co. (now Mobil Oil Co.) 1 Campbell came in for 201 bbl. daily on pump, and over the next year, it produced about 15,000 bbl. of 12.2° oil before it was abandoned. Exploration on other East Texas domes, revived a bit by the Concord find, sputtered and died again.

Capped by success . . . For 13 years, the 17 "dry" domes of the Tyler basin languished in exploratory neglect. Then, in 1956, Chapter 3 broke. British-American Oil Producing Co., after an exhaustive geophysical study, discovered oil in the Travis Peak-Comanchean* on the Hainesville dome in Wood County; the 1 Weisenhunt flowed 259 bbl. per day from 9,217-47 ft. The discovery later proved to be somewhat disappointing and production fell rapidly, but the strike was sufficient to set off the biggest lease play East Texans had seen in many years. Every salt dome in the region, plus those in North Louisiana and southern Mississippi, felt its touch.

Almost at the same time as the Hainesville success, Texaco Inc. wrote Chapter 4 of this story at Bethel dome in northwestern Anderson County. Its 2 Williams, in August 1956 made a 54-bbl. pumper from Woodbine sand at 5,622-30 ft. It is here that the true potential of these domes has been best demonstrated. Fourteen Woodbine oilers and several 8,300-ft. Rodessa gas-condensate wells have been finished on the west flank of Bethel, while on the east flank, flush Rodessa gas-condensate has been found at 9,800 ft.

In 1958, Texaco added a fifth chapter to the salt-dome story, this time at Oakwood dome in southeastern Freestone County. Texaco 1 Rabe made 142 bbl. per day from 247 ft. of Woodbine sand in April. Seven dry holes and a lot of geophysical study preceded the strike; the discovery penetrated 4,100 ft. of salt overhang before it found the sand. Finding the narrow band of productive pay around the dome has proved a major challenge.

Last October, Whiffen Estate, Inc., of Dallas, took up the torch and finished Chapter 6. The 1 Daniel Memorial Orphanage, on the west flank of Butler dome, eastern Freestone County, came in for 112 bbl. per day on pump. Production was from Woodbine at 4,707½-13½ ft. It was in the immediate vicinity of four dry holes, and only 75 ft. east of one of them. But East Texas had its fifth producing dome. The field has been christened "Graddy" instead of Butler.

So the score today is 6 down, 12 to go. No doubt, most of these 18 domes will produce oil or gas. It won't be easy, but the succeeding chapters of this story will come for sure.

*Originally reported as a Woodbine reservoir; some consider the pool to be Cotton Valley-Jurassic in age.

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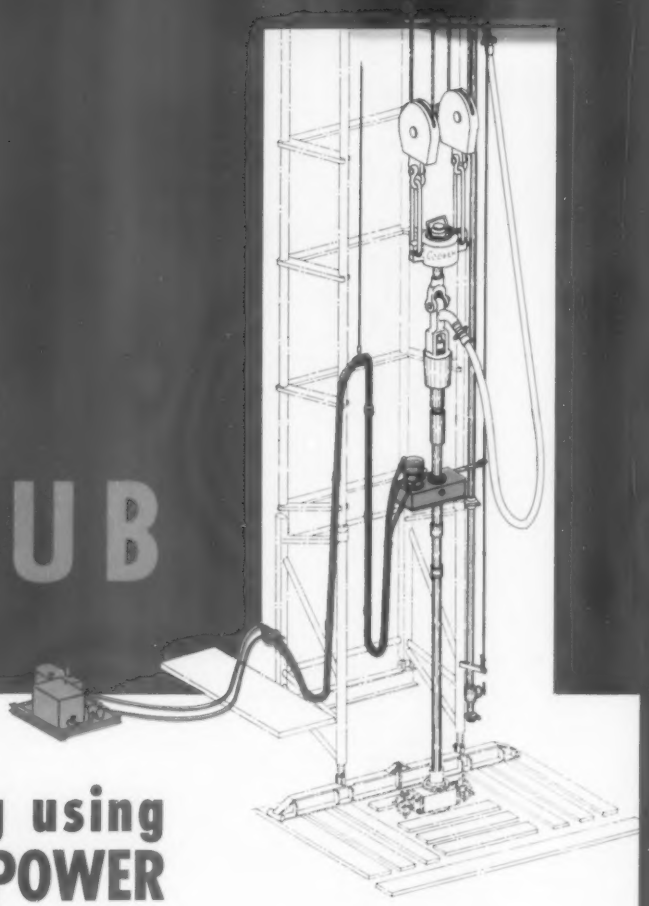

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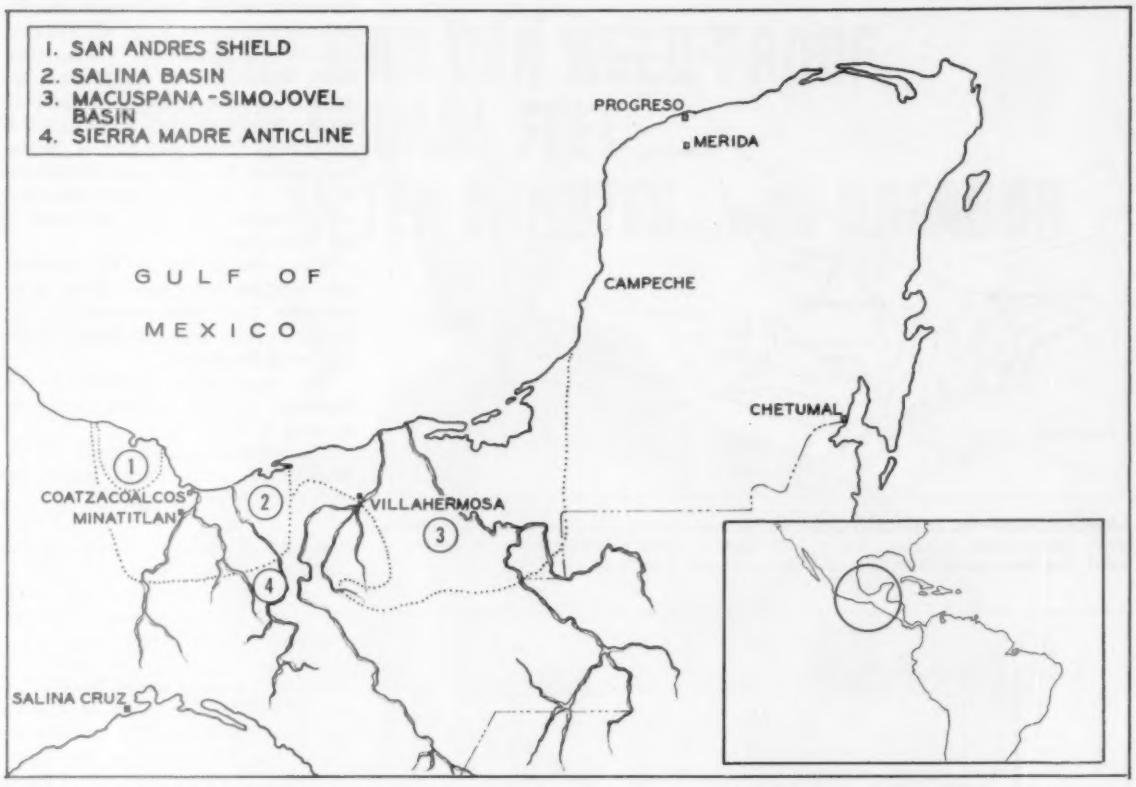


TECTONIC FEATURES of the producing area—called the Southern zone—is located on the northern part of the Isthmus of Tehuantepec.

With salt-dome prospects getting better all the time, a Mexican geologist takes a careful look at the

Isthmus of Tehuantepec

Written by **Roberto Gutierres Gil,** district geologist, southern district, and translated by **Lauro A. Yzaguirre,** district geologist, Reynosa district, Petróleos Mexicanos.

THE oil-producing area which we call the Southern zone, is located in the northern part of the Isthmus of Tehuantepec. With the discovery of new fields in the coastal plain and offshore of the State of Tabasco, the productive area has been extended to the east and includes the southeasterly part of the State of Veracruz. Further, to the east, in the State of Campeche (Palizada and Pom), only noncommercial shows of oil have been found. In Xicalango, gas has been discovered which can be exploited commercially.

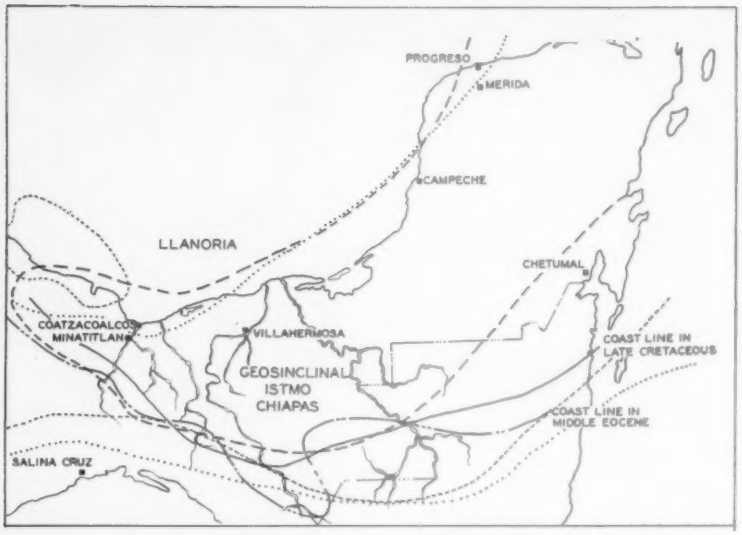
Until recently, the fields of the Southern zone were grouped in three production districts for administrative purposes. Of the three, the Tonalá and El Plan districts belong to the salt-dome area.

The Saline basin extends from the extreme southeastern part of the State of Veracruz to the central part of the State of Tabasco. The oil produced in this area is associated with typical salt-dome traps on the flanks of the structures. Minor amounts of oil have been found on the top of the domes and some within the caprock.

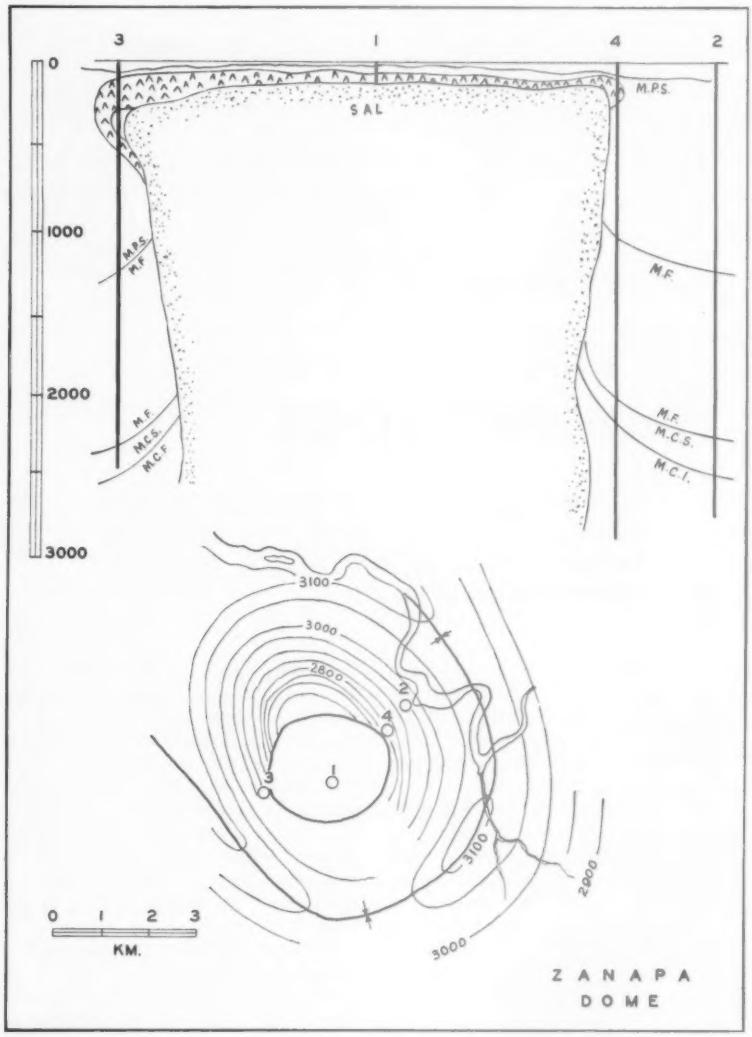
The area which we are discussing has been explored by surface geologic, gravity, and seismic methods. Since 1906, when the first wells were drilled, through July of the past year, 1,511 exploratory and production wells have been drilled, and 23 fields discovered in the Tonalá and El Plan districts, in the Macuspana and Mecoacan areas.

A third district, Macuspana, was discovered and developed by Petróleos Mexicanos and corresponds to the Macuspana basin in which numerous structures have been found. Some of these structures—Encarnación, Amate Barrancas, Frontera Nacional, etc.—are a result of the Sierra Madre orogeny while others whose origin is unknown may be due to deep salt domes and are found parallel to the edge of the basin.

A fourth district was discovered by Petróleos Mexicanos in 1958 in an area called Comalcaco. Geologically, it may be considered an extension of



PALEOGEOGRAPHIC DISTRIBUTION is as follows: dotted line—Lower Permian; long dash line—Lower Jurassic; short dash line—Middle Cretaceous; solid line and solid line interrupted with double dash—Lower Cenozoic.



A CROSS-SECTION and plan view of the Zanapa dome indicates salt piercement of beds.

the northern part of the Chiapas anticlinorium which dips rapidly to the northwest, in the State of Tabasco, almost to Camalcalco. These structures, which are very complicated, are masked by the Miocene formations which were deposited unconformably over them. The situation is further complicated by a salt mass discovered at 2,593 m. in the Julapa structure, which implies a probable extension of the Saline basin.

The wells drilled in the southern part have been dry while those in the northern part have uncovered two fields, Tupilco and Mecoacán, which are being developed.

The formations identified in the Southern zone have been subdivided as seen in Table 1.

The oil-bearing formations of the Macuspana and Saline basins are mainly of Miocene age.

Red beds . . . In the Saline basin they are observed in the upper part of domes such as Tanalápa and Cerro Pelón and consist of red sandstones and conglomerates with some interbedded sandy shales. No identifying fauna have been observed but they are thought to be Triassic to Middle Jurassic in age since they underlie the Chinameca limestones of the Upper Jurassic. In the State of Chiapas these red beds have also been observed. In Cerro Pelón they are slightly salt bearing and some salt-water springs emanate from them.

Chinameca limestone . . . Only within the Saline basin have these limestones been observed and they are well stratified, ranging from thin-bedded to laminated, with alternating marl beds. These limestones on the Tanalapa dome, 50 miles to the west of Coatzacoalcos, had oil shows.

Sierra Madre limestones . . . These limestones outcrop in the southern portion of the Macuspana and Saline basins. Between the two basins there is a high on these limestones which corresponds to the Chiapas anticlinorium. They are thick-bedded, compact with some porosity due to dolomitization and to date are nonproductive.

Méndez . . . The name Méndez has been applied to Upper Cretaceous shales of Turonion age which are well bedded with occasional interbedded sandstones and conglomerates. Their thickness, of 500 to 900 m., thins to

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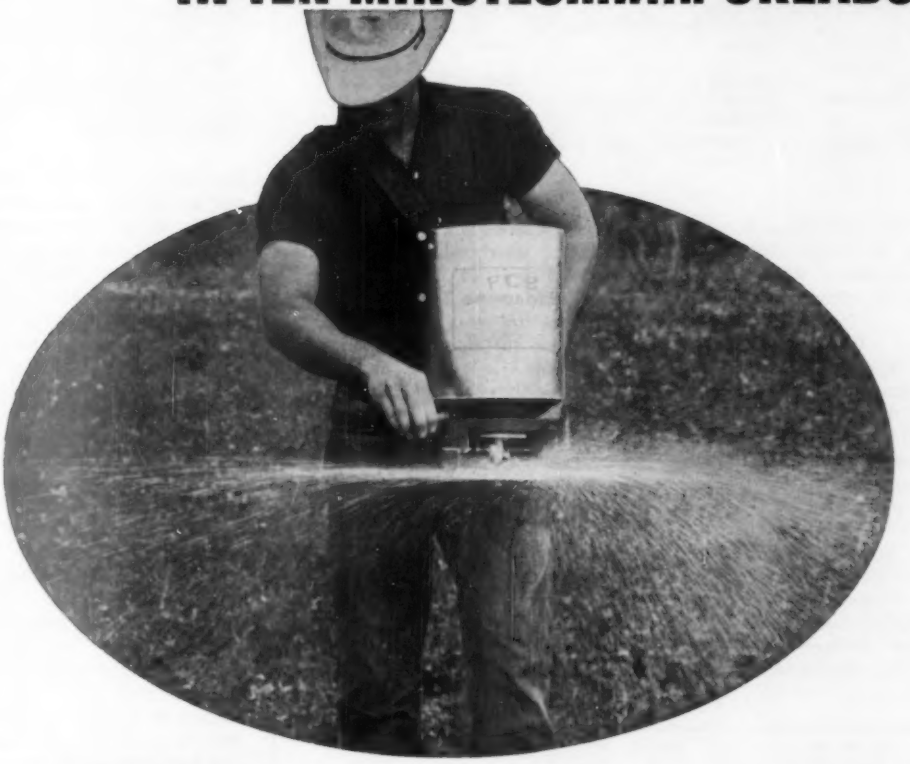

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TABLE 1

Era	Period	Saline basin formation	Macuspana basin formation
	Pliocene	Cedral	Tres Puentes
		Agueguexquite	Belem
		Unconformity	
Cenezuico	Miocene	Paraje Solo	Zaragazal
		Filisola	Encajonado
		Upper Concepción	Upper Amate
		Lower Concepción	Lower Amate
		Encanto	
	Oligocene	Deposito	Macuspana limestone
		La Laja	Macuspana shale
		Nanchital conglomerate	
	Eocene	Upper	Lower
	Paleocene		
		Mendez	Mendez
	Cretaceous	Sierra Madre limestone	Sierra Madre limestone
		Chinameca limestone	
Mezozoic	Jurassic	Chinameca limestone	
		Red beds	

the south of the Macuspana basin due, probably, to a facies change from marls to limestones which may be Sierra Madre in age.

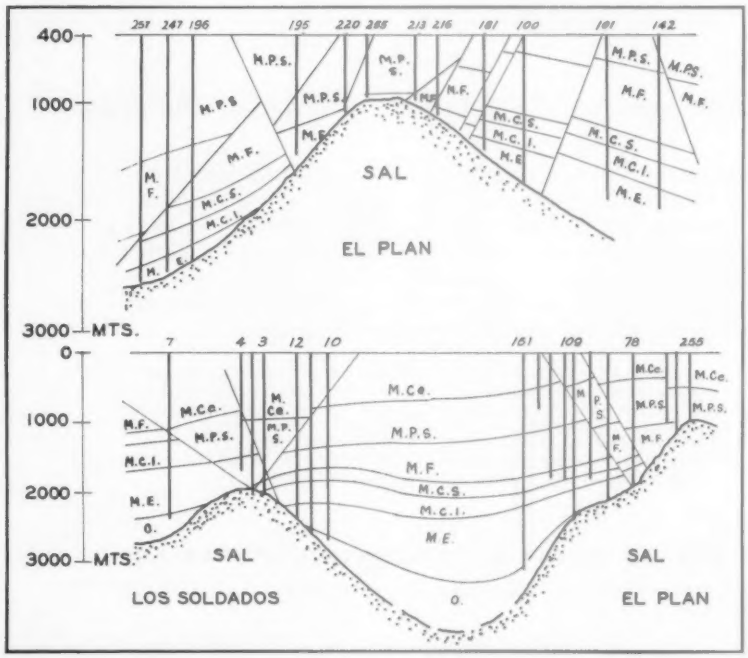
Paleocene . . . The Paleocene is represented by clean, well-stratified shales which are separable only by paleontology. The Paleocene with a thickness of 800 m. in the Saline basin, increases greatly to the east, especially in the Macuspana basin, where its thickness is duplicated.

Eocene . . . Sediments of the Eocene have been divided unto Upper and Lower parts by paleontology, have not been subdivided, and are represented by 1,200 m. of well-bedded shales with occasional interbedded conglomerates whose thickness reaches 300 m. while the interbedded sands reach a thickness of 10 to 50 m.

In the Macuspana basin the Eocene shales reach a total thickness of 3,000 m. with alternating thin sandstone beds which are 3 to 10 cm. in thickness; also some thin-bedded limestones and marls are noted.

Oligocene . . . The Oligocene beds of the Saline and Macuspana basins vary greatly lithologically and paleontologically; a description of the Oligocene follows:

1. **Nanchital conglomerate**—Consists of conglomerate up to 500 m. thick in the south of the Saline basin and marks the base of the Oligocene.
2. **La Laja**—Consists of well-bedded shales up to 1,600 m. in thickness and outcrops along the southern and western edge of the Saline basin.
3. **Deposito**—This shale formation is lithologically similar to the La Laja and is differentiated by paleontology; its thickness is 2,000 m.
4. **Macuspana shale**—This outcrops along the southern edge of the Macuspana basin where it has attained thickness of 800 m. of well-stratified shales and some marls.
5. **Macuspana limestone**—This formation outcrops in the south of the basin and is a reef-type lime attaining a thickness of 600 m. which increases to the east.



DETAILED SECTIONS across two of the area's salt domes, Los Soldados and El Plan.

Miocene . . . Formations of Miocene age are in the main productive horizons with the most important being lower Miocene in age such as the Concepción and Encanto of the Saline basin and the Amate of the Macuspana basin.

1. **Encanto**—The Encanto formation is the main producing zone of the Saline basin and attains a thickness which varies from a few meters over the top of the domes to 1,200 m. on the flanks and it consists of well-bedded shales with alternating sand bodies from 3 to 50 m. in thickness. In most of the fields there are from 2 to 10 producing sands. The Ogarrio and Magallanes fields total 90 m. of producing sands.
2. **Concepcion inferior**—This formation consists primarily of shales with fewer interspersed sands than the Encanto but with a well-defined sand section in its lower part which is productive in Tonalá, El Burro, El Plan, and Los Soldados fields.
3. **Lower Amate**—This formation which consists predominantly of shales has been drilled in few wells. In the Fortuna Nacional field some oil and gas has been produced from its lenticular and poorly developed sand bodies; in age it is equivalent to the Encanto and Concepción Interior formations.
4. **Concepción Superior**—(fault and unconformity). In the Saline basin the Concepción Superior is very sandy but no production, with the exception of El Plan, has been found; its thickness varies from 300 to 500 m.

The Concepción Superior, in the Macuspana basin, is equivalent to the Amate Superior with a thickness which varies from 2,000 m. in the Central Comalcalco district to 200 m. in the south. It consists of alternating shales and sands which vary from 50 to 200 m. for the shales, to 10 to 360 m. for the fine-grained sands and is the principal producer in the Macuspana and Comalcalco districts.

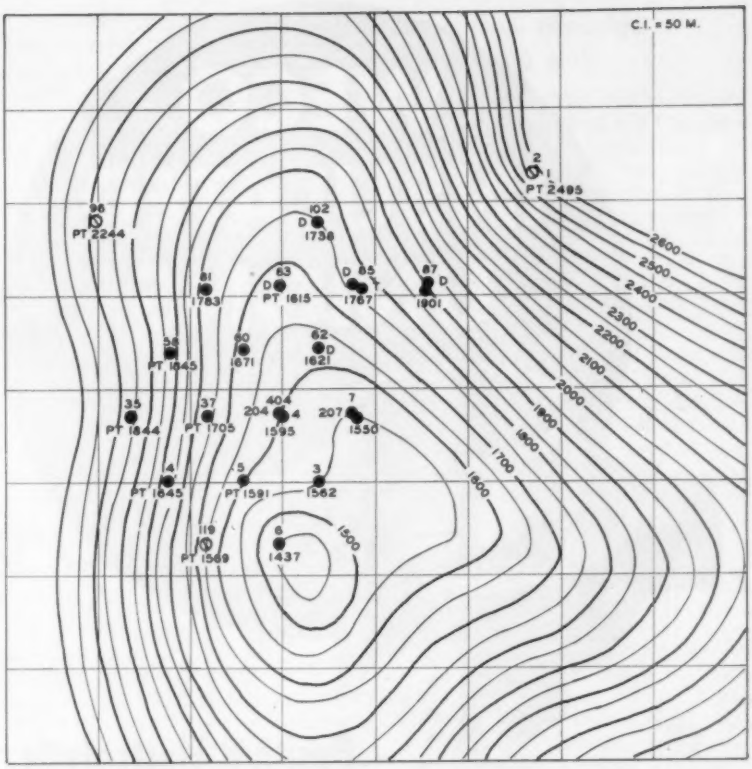
5. **Filisola**—The Filisola represents

the Middle Miocene and consists of fine-grained shaly sands up to 450 m. in thickness and is commercially productive only in the El Plan field. In the Macuspana basin the Filisola is equivalent to the Encajonado with a thickness of 700 to 900 m. of nonproductive sands.

6. **Paraje Solo**—This formation is representative of the Upper Miocene and consists of soft, carbonaceous shales with alternating lignite and sand beds which vary from 1 to 30 m. in thickness and total 700 m. In the Acalapa and El Plan fields small commercial production has been found in fault blocks where the sands of the Encanto and Paraje Solo have been faulted together and it is assumed the oil migrated from the Encanto. The Paraje Solo in the Macuspana basin is equivalent to the Zargazal which is thicker and sandier but with a diminished amount of lignite and is productive, in six horizons, in the Vernet field.

7. **Agueguesquite**—These are marine sediments which unconformably overlie the Paraje Solo and reach 80 m. in thickness and outcrop in a small area to the east of Coatzacoalcos and are, to date, nonproductive.

8. **Cedral**—This formation, 700 m. thick, which is composed of shales and poorly consolidated sands is productive in the El Plan field where it is assumed the oil migrated along the fault planes from older formations. In Macuspana the equivalent of the Cedral is the Belem formation, a marine deposit of shales with thin, fine-grained sand beds whose total thickness reaches 800 m.



STRUCTURE CONTOURS on top of the anhydrite of the Magallanes field.

Pliocene

1. **Tres Puentes**—This Pliocene formation has been identified only in the central and western part of the Macuspana basin along the flanks of the Vernet and Amate structures and is composed of thick-bedded sands and shales.

(To be continued)

Important circular released on Latimer

Due to the increasing importance of the Arkoma basin of southeastern Oklahoma and northwestern Arkansas, a new circular on the geology of northern Latimer County, Oklahoma, takes an interest as an addition to the geology of the region.

The new booklet, Circular 50, may be obtained from the Oklahoma Geological Survey in Norman. It is by Dearl T. Russell. Purpose of the report is to submit a detailed geologic map of rock units cropping out in an area which had never been mapped for publication. Attention is also directed to character of lithology, thickness of strata, structural anomalies, and correlation of units with those cropping out to the north in Haskell County.

Northern Latimer County is underlain by Pennsylvanian rocks of the Atoka, Hartshorne, McAlester, Savanna, and Boggy formations. Structural features are the Adamson anticline, Sansbois syncline, Burning Springs anticline, and the Brazil anticline. Coal beds of commercial value are the Hartshorne coals, and the McAlester coal.

Geologic structures favor the accumulation of petroleum in parts of the area, but none is currently produced. The absence of liquid hydrocarbons may be ascribed to high fixed carbon ratios of the surrounding coal region and to the lack of source beds and permeable reservoir rocks. Small quantities of gas have been produced at Red Oak field in previous years. With the recent successes throughout this section of Oklahoma, Latimer County may take on new importance as a future petroleum arena.

Inglewood deep test reaches total depth

In California Humble Oil & Refining Co. was conducting water-shutoff tests in its 13,516-ft. 1 Buckler Community on the southeast edge of the Inglewood field in the Los Angeles Basin. The test set a new depth mark for the field. The deepest producing zone in the area is the Sentous sand found at around 8,400 ft. Standard Oil Co. of California drilled an 11,736-ft. well about 1,000 ft. to the south of the Humble well some years back.

Big gas well for California Arbuckle

Occidental Petroleum Corp. reported 1 Arbuckle Unit M located about ½ mile west of production in Colusa County's Arbuckle gas field tested at a rate of 6,960 M.c.f.d. from the interval 5,943-54 ft. The operator was drilling ahead below 5,983 ft.

Basin activity centers in tristate area

All three states in the Illinois basin were represented in last week's basinal developments.

In Muhlenberg County, western Kentucky, Stouder Drilling Co.-Ashland

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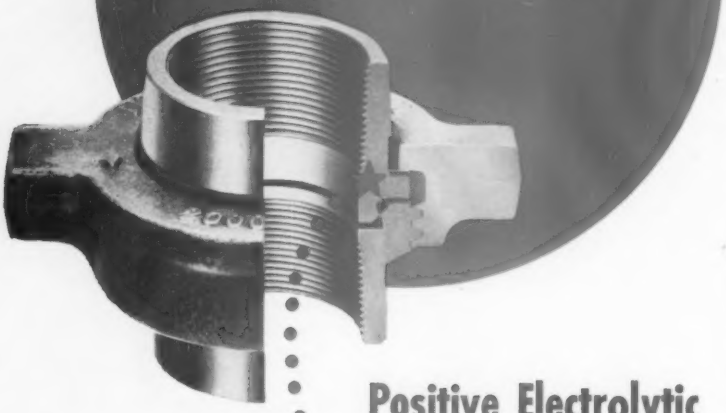

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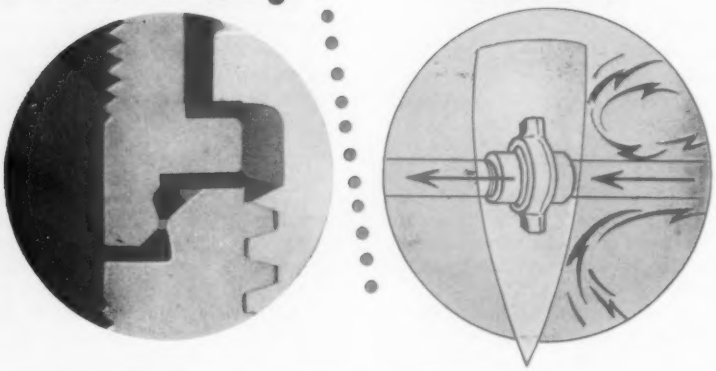

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Oil & Refining Co. 1 Lelian Scott in 14-I-27, 2 miles southwest of Graham Station, is a new pay discovery for the area. The well swabbed 6 bbl. of oil per hour and will be pump tested. New pay is the Paint Creek sand at 1,748-73 ft. Location is ½ mile from any production and 4 miles from similar paying production.

In Webster County, Kentucky, Iley B. Browning & Sons and King-Stevenson Oil Co. have a good well at 1 W. W. McCoy Heirs in 1-L-22, 1½ miles southeast of Dixon. The well flowed 457 bbl. of oil daily after fracture in Hardinsburg sand at 2,581-96 ft. Another pay, the Cypress sand at 2,787-2,828 ft., made 25 bbl. per day.

In Jefferson County, Illinois, John Dunnill 1 Luther Barnett, SW SE NE 18-1s-4e, 7 miles northeast of Mount Vernon and 2 miles from other lower McClosky and St. Louis wells, made 168 bbl. per day, pumping natural, from lower McClosky at 2,820-26 ft. and St. Louis at 2,846-50, 2,858-62 ft.

In Spencer County, Indiana, Charles J. Schroll 1 George Foertsch, NE NW NE 31-5s-4w, 4 miles south of Santa Claus, pumped 50 bbl. per day, natural, from Jackson sand at 719-726 ft.

Deep Knox test to drill in East Kentucky

An interesting test is currently drilling in extreme northeastern Kentucky.

In Lewis County about 7 miles southeast of Vanceburg, the county seat, Ralph Thomas 1 Daisy Adams is drilling ahead at 1,375 ft. The well is designed to have a look at the Cambro-Ordovician formations. Only two wells in the entire county have previously penetrated formations of that age.

Reef find looms in Michigan area

IN MICHIGAN, Sunray Mid-Continent Oil Co. has made an apparent new field discovery at the wildcat 1 Bollaert, NW SW 33-6n-13e, St. Clair County.

The discovery well is located about 1 mile south of Allenton and 40 miles north of Detroit, and is Sunray's first production in Michigan. The company holds considerable exploration acreage in the state.

In a 1-hour test the well gaged at the rate of 200 bbl. of 41°-gravity oil per day through a 24/64-in. choke following perforations at 3,800-25 ft. opposite the Niagarian reef. Flow pressure registered 180 lb. and casing pressure was 500 lb. Total depth was 4,061 ft. in the Clinton shale.

Sunray holds approximately 2,500 acres in the immediate area of the discovery well.

The new discovery well is 15 miles northwest of proved production in Boyd field. The apparent field discovery is only the second production in St. Clair County.

Abo well finaled in New Mexico

More Abo sand production is reported in southeastern New Mexico's Eddy County at Humble Oil & Refining Co. 1 Abo-Chalk Bluff Draw Unit on the southwest side of Empire-Abo field.

The well, 6 miles southwest of Artesia in 9-18s-27e, flowed 70 bbl. of 44°-gravity oil in 13 hours on potential test through 3/16-in. choke from perforations at 5,600-28 ft.

Dakota gas reported at San Juan basin well

A Dakota gas discovery was completed in San Juan County, northwestern New Mexico in the San Juan basin. Discovery well is Southern Union Gas Co. 1-18 Federal in SW SW 18-30n-12w, 6 miles northeast of Farmington.

The well was finaled on calculated absolute open flow of 1,686 M.c.f.d. Production is from perforations at 6,520-6,720 ft.

Graneros has shows at New Mexico well

The Graneros yielded up to 1,668 M.c.f.d. on tests at 7,166-86 ft. at a wildcat in Rio Arriba County, northwestern New Mexico, San Juan basin. Indicated discovery is Pan American Petroleum Corp. 1 Jicarilla-147, NE NE 8-25n-5w.

The well is now shut in. It is located in Otero-Mesaverde-Pictured Cliffs field and 3 miles north of Gallup oil production established earlier this past year.

Tyler wildcat slated for Central Montana

Central Montana will get a Tyler wildcat at Sinclair Oil & Gas Co. 1-B Kesterson in C SE NW 34-10n-33w, Rosebud County. The 5,250-ft. wildcat is 2 miles south of Sumatra town and about 2 miles from any drilling. Location is 5 miles west of the old Sumatra field area and some 6 miles southeast of the southeast end of Northwest Sumatra field.

Good flow reported at Montana well

In Monarch field, Fallon County, eastern Montana, Shell Oil Co. gaged 74 bbl. of oil with some water per hour during a 2-hour test at 12-26 Bach in SW NW 26-9n-58e.

Flow was from perforations at 8,523 to 8,533 ft. on ½-in. choke. Shell shut in the well. It is one of a trio of wells drilled in this section. It is the westernmost oiler in Monarch field.

This Silurian producer is about midway between Pennel and Cabin Creek fields on the Cedar Creek anticline. It lies in the shallow gas field on the anticline, but is 3 miles from oil production. This is one of the best gages reported in the Monarch area yet.

Cow Creek is dual discovery

WYOMING'S first significant discovery of 1960 is completed in both Frontier and Nugget zones. Sohio Petroleum Co. 1 Cow Creek Unit, NW SE 12-16n-92w, Carbon County, has a combined potential of 10,965 M.c.f.d. and 40 bbl. condensate per day.

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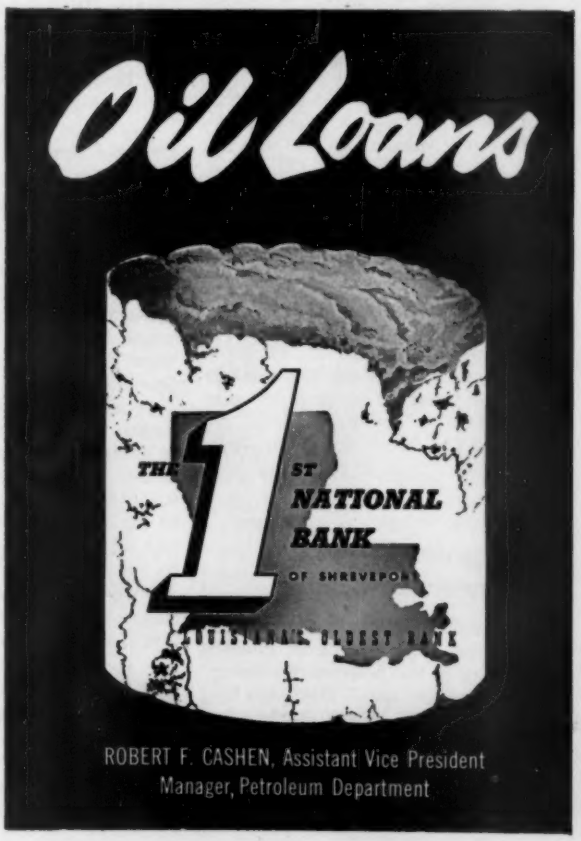

Production from the Frontier Cretaceous is at 8,510-45 ft. through ¼-in. choke. Nugget Jurassic produces at 9,630-50 ft. through 19/64-in. choke. There were commercial flows in Mesaverde and Mancos Cretaceous rocks, also, and some oil recovered on test of the Shinarump.

This new field is 7 miles northwest of Deep Creek field, a Mesaverde gas producer. The Deep Creek discovery was one of the forerunners of the advance of Mesaverde as a prolific new Wyoming target. Sohio's well is one of the deepest wells in this section of the state at 11,265 ft.

Bell Springs test flows from Sundance

In Wyoming, Sinclair Oil & Gas Co. has completed a gas discovery well in the Bell Springs area of Carbon County.

Sinclair's 1 Grizzly Cattle Co., in SE NE 19-23n-88w, flowed 8,150 M.c.f.d. from Sundance perforations at 2,706-46 ft.

● In the Rozet field of Campbell County, Sinclair completed 6 Peter Svalina Tract 3, a northwest extension, in SE NE 15-50n-70w, pumping 225 bbl. of oil daily from Muddy perforations at 7,018-50 and 7,054-58 ft.

Wyoming wildcat recovers Frontier oil

Oil was reported on tests of the second Frontier Cretaceous sand at a Natrona County wildcat in Central Wyoming. The well is Davis Oil Co. 1 Federal-Burke in C NW NW 1-36n-79w.

Location of the wildcat is 4 miles south of Burke Ranch field. A test at 6,010-35 ft. got 21,400 cu. ft. of gas per day after 2 hours. Recovery was 580 ft. clean oil and 60 ft. of 10% cut muddy water, 120 ft. of 50% mud-cut oil, 190 ft. of 10% oil-cut mud. This indicated strike is ¼ mile southwest of a dry hole drilled by Carter Oil Co. in SE SE 36-37n-79w. Burke Ranch field is a Dakota producer.

East Powder River to get Minnelusa wildcat

A Minnelusa Pennsylvanian wildcat is slated for the east side of Powder River basin in northeastern Wyoming.

The important test is Davis Oil Co. 1 Robinson in C SE SE 9-49n-67w, 2½ miles southeast of Moorcroft field and 3¾ miles southwest of Grasshopper Butte. The 6,600-ft. well is ½ mile from any previous drilling.

Oklahoma exploration shapes up with important new discoveries

THIS YEAR'S exploratory program in Oklahoma is beginning to shape up fast with important discoveries reported throughout the state.

In Harper County, Statex Petroleum Co. 1 Bennett is a Hunton Siluro-Devonian discovery for the Lovedale area. The well, located in 29-27n-21w, flowed 1,630 M.c.f.d. during tests. A test at 7,135-96 ft. got 3 M.M.c.f.d. with an oil spray, and at 7,233-7,305 ft. it made 2,626 M.c.f.d. The first offset is the 1 Weaver in C NE SW 28-27n-21w.

Other Harper developments include the Sinclair Oil & Gas Co. discovery in the Viola at 2 Holcomb in C SE NW 7-28n-22w. This North Buffalo field test flowed 9,972 M.c.f.d. with 3 bbl. condensate per hour from 7,304-11 ft.

Woodward County . . . Ashland Oil & Refining Co. opened Chester gas production at the second well in West Chester field in the southeast part of this northwestern Oklahoma county.

The 1 Fox Unit extended the one-well field 1 mile southwest. Location is C SW NE 4-20n-17w. The well flowed 5 M.M.c.f.d. of wet gas from Chester Mississippian at 7,978-93 ft. Other county activity includes Shell Oil Co.'s wildcat, 1 Blasdel in C SW NE 21-23n-22w, northwest of Woodward field.

Dewey County . . . First Cleveland Pennsylvanian sand production for this county was opened at Humble Oil & Refining Co. 1 Spangler in 13-17n-19w. The well flowed 1,200 M.c.f.d. for awhile through perforations at 9,142-84 ft. From Morrow it made 5 M.M.c.f.d. on drill-stem test below 11,700 ft. This well is in the West Valley Center area, a Tonkawa-Oswego producing area.

Other Dewey County developments include Texaco Inc.'s third location at North Oakwood. The 1 Chain Unit, C SE NW 8-17n-14w, will go to 9,950 ft. The 1 Thomas, second well in the field, C SW NE 16-17n-14w, had oil and gas shows at 9,539-9,621 ft. on cores. The discovery well, a Morrow Pennsylvanian gas-condensate strike, is in Section 9. Flow there was from 9,490-9,576 ft.

Manning trend . . . The newest discovery in the Kingfisher County Manning Mississippian play is 1 Snow, 5-15n-7w. It flowed 5,200 M.c.f.d. through choke from perforations at 7,814-57 ft. North Dover and East Hennessey fields are both being developed at a fast clip.

Comanche County . . . Springer Pennsylvanian gas-condensate production was opened at 2 Mansel, a Continental Oil Co. well in 14-3n-10w, reopening East Fort Sill field. That field was originally an Arbuckle Cambro-Ordovician producer.

The Continental discovery flowed 1,315 M.c.f.d., natural, through 24/64-in. choke with more than 30 bbl. condensate per million on tests of Springer perforations at 10,038-42 and 10,066-70 ft.

Murray County . . . Basal Oil Creek Ordovician production was opened at Sohio Petroleum Co. 1 Hale in 1-1s-2e, Murray County. This wildcat, located between Sandy Creek and West Moss fields, flowed 128 bbl. per day on ⅛-in. choke from 3,872-74 ft.

Haskell County . . . Atoka Pennsylvanian gas production was found in shallow Kinta gas field in this Arkoma basin area by Ambassador Oil Corp. The 1 Steele, 5-7n-20e, south of the Kinta area, flowed 4,250 M.c.f.d. from 5,636-73 ft.

Beaver County . . . Oil-hunting continues brisk in the Panhandle area, particularly in the Dower-East Camrick area from 1n-20eCM to 1n-21eCM. Carter Oil Co. 1 Clapo, C NW NW 30-1n-21eCM, flowed 816 bbl. per day from Morrow at 7,464-92 ft. Carter 1 Sager in C NE SW 35-1n-20eCM, swabbed 432 bbl. per day from 7,462-7,506 ft.

The South Glenwood area of Beaver County in the Oklahoma Panhandle picked up a big gas producer at Carter Oil Co. 1 Wheeler, NE NE SW 8-5n-27eCM. The well flowed 55,200 M.c.f.d. on open flow of basal Morrow Pennsylvanian perforations at 6,496-6,504 and 6,524-40 ft.

Cimarron County . . . This far-western Panhandle county has an important deep test going at Apache Oil Corp.'s 1 State, C SW SW 36-5n-3eCM. The wildcat will go to 7,450 ft. and is 12 miles from production.

Cleveland County . . . Anderson-Prichard Oil Corp. completed the first Arbuckle producer at Northwest Noble at 4 Frank Tullius, C SE NW 16-8n-2w. The well flowed 519 bbl. of oil per day on 24/64-in. choke from 8,791-8,822 ft. It also produces from McLish Ordovician sands.

The 2 Slajer in NW NE SW 16, a Petroleum, Inc. well, flowed 192 bbl. per day on ¼-in. choke from 8,813-20 and 8,839-42 ft., and is the second Arbuckle producer here.

Coal County . . . In Arkoma basin's Northwest Centrahoma field, International Oil Co. 2 Crane in C NW SE 19-2n-9e is a new pay discovery in Hartshorne Pennsylvanian at 1,816-26 ft. Flow was 1,320 M.c.f.d. The first well here had Booch sand at 1,600 ft.; first oil was Hunton at 5,800 ft.

Ellis County . . . This western area's new pool is an extension of West Shattuck. It is Oklahoma Natural Gas Co. 1 Gibbs in C SE NW 19-21n-25w. Perforations at 9,244-56 ft. in Morrow flowed 600 bbl. condensate per day and 5,500 M.c.f.d. From lower Morrow at 9,805-18 ft. it flowed 2,000 M.c.f.d. and the same at 9,902-30 ft. It flowed 4,002 M.c.f.d. from 9,960-67 ft.

Grady County . . . The deep Southwest Bradley area of this southwestern county gained a good Bromide Ordovician producer at Musgrove Petroleum Corp. 1 Godfrey in C NE NW 4-4n-5w.

The well flowed 25-30 bbl. per hour on ¼-in. choke from perforations in Bromide between 13,815 and 14,043 ft.

Grant County . . . The busiest area in northern Oklahoma is North Satchell Valley Red Fork Pennsylvanian field.

W. C. McBride, Inc., completed an east offset extension discovery at 1 Simmons in NW NW SE 20-27n-4w for 377 bbl. per day on ¼-in. choke from perforations at 4,826-36 ft.

Remote Ohio well may hit Trenton

SINCE the turn of the century, many attempts have been made in southwest Ohio to establish production in the Trenton formation.

A recent discovery of interest is the Dwaine P. Moose 1 Marguerite Jenkins, Section 11, Butler Township, Montgomery County, located about 17 miles southeast of Arcanum pool whose discovery well was drilled in 1887. The top of the Trenton was found at 1,070 ft. and gas in the formation from 1,127 to 1,135 ft. which gaged 240 M.c.f.d. natural. Shut-in gage was 160 M.c.f.d. with rock pressure of 310 psi. Total depth 1,135 ft.

Production tests are continuing to determine the commercial value of this well.

Here's the Texas drilling picture:

New Devonian well for Texas' Andrews

Andrews County in West Texas has a new Devonian discovery about 1 mile northwest of the town of Andrews. It is Sinclair Oil & Gas Co.'s 7 Ora Cobb, a new pay for the immediate area, at North Andrews field.

Sinclair finaled the flowing well for 562 bbl. of 45°-gravity oil in 17 hours through 12/64-in. choke for a calculated daily open flow rate of 792 bbl. Perforations were at 10,424-84 ft.

Previously, this well was an Ellenburger producer at 12,373-390 ft., making 504 bbl. of oil per day, 45° gravity, through 10/64-in. choke. Ellenburger is the regular field pay. There is also Strawn production at North Andrews. Location of the Devonian discovery is in the northwestern quarter of Section 16, Block A-46, PSL Survey.

Texas' Nolan County has Mississippi strike

Mississippian lime production was tapped at a Nolan County wildcat in North Texas. The discovery is West Central Drilling Co.'s well in NE¼ Section 58, Block 23, T&P Survey, 2½ miles southeast of the town of Roscoe.

The well pumped 29 bbl. of oil per day from perforations at 6,938-48 ft.

New pay discovery in Texas' Cooke

Cooke County, North Texas, has a basal Strawn Pennsylvanian pay at John E. Kirkpatrick 2 Florence D. Estes, 13 miles northeast of Gainesville.

The well, located in T. Toby Survey A-1054, made 85 bbl. of oil on tests at 5,380-5,401 ft. The field is called West Walnut Bend (Basal Strawn) field. It lies 1¾ miles west of Walnut Bend (Winger sand) field.

Deepest pay hit at Texas' S. May

SOUTH TEXAS' growing South May area, opened in 1956 as a major extension of the extensive and prolific May gas-condensate field, added its seventh and deepest productive horizon last week.

The new pay, set up as Fault Block "B," Basal-4 reservoir, is perforated at 9,635-41 ft., where, as the lower zone of a dual completion, it flowed at the rate of 1,665 M.c.f.d. of gas through 12/64-in. choke.

Its 51°-gravity condensate recovery was in the ratio of 73,700 cu. ft. of gas per bbl. of liquid. Flowing pressure was 2,770 psi. Calculated open-flow potential is 3,850 M.c.f.d.

The well is Arkansas Fuel Oil Corp.'s 2-B Leo Kaufer, 3 miles southeast of Riviera, in southern Kleberg County, on the lower coast. It is near the border of Kenedy County, into which county the field stretches.

The upper pay in the well's dual completion is one of the field's previously established producing zones. It is perforated at 9,413-50 ft. and is rated good for 14,500 M.c.f.d. of gas, open-flow potential. A 49°-gravity condensate is recovered in the ratio of 70 M.c.f. of gas to 1 bbl. of liquid.

Silurian gas pool opens in Texas area

Silurian gas production is reported at a wildcat in Fradean field, Upton County, West Texas. Location is 8 miles northeast of McCamey.

The discovery well is Odessa Natural Gas Co. 1 J. H. Shirk Estate in Section 23, Block 2, MK&T Survey. Completion, calculated absolute open flow, was 19,100 M.c.f.d. from perforations at 8,935-78 ft. This well was earlier a Strawn Pennsylvanian and Ellenburger Cambro-Ordovician oil discovery. From Ellenburger it made 1,719 bbl. of oil per day on 32/64-in. choke; from Strawn it flowed 205 bbl. per day on 12/64-in. choke at 8,004-24 ft.

Lubbock area Texas wildcat gets shows

Clearfork shows were reported at a 8,700-ft. wildcat in western Lubbock County, West Texas. Honolulu Oil Corp. 1 Graham Holmes, Section 26, Block JS, EL&RR Survey, was drilling ahead below 6,512 ft. in lime after finding oil and gas shows in the Clear Fork. The test was at 5,531-72 ft. Recovery was 90 ft. slightly oil and gas-cut mud, 90 ft. of slightly gas-cut mud.

A test at 5,529-72 ft. got 30 ft. of mud and gas-cut oil, 90 ft. heavily oil and gas-cut mud, and 540 ft. of slightly oil and gas-cut mud. A drill-stem test at 5,563-88 ft. got 1,200 ft. of gas in drillpipe, 210 ft. mud-cut oil, 180 ft. heavily oil and gas-cut

mud and 90 ft. slightly oil and gas-cut mud. A test at 5,588-5,610 ft. got 30 ft. mud-cut oil.

This possible field-opener is located 7 miles southwest of Edmission field and 1½ miles southwest of an 11,466-ft. dry hole.

New try slated off Texas coast

Another deep test is scheduled by Standard Oil Co. of Texas on its big offshore lease block 15 miles off the coast of Jefferson County and nearly 40 miles northeast of Galveston.

Its location is 2½ miles southeast of the company's discovery well completed on the block last year. The latter well opened the only offshore field found off the Texas coast last year.

The new test is in Large Tract 68, which adjoins on the south Large Tract 52, in which the discovery well was drilled. It is projected to 11,500 ft. Discovery well was drilled to 9,928 ft. and completed in a Miocene sand, perforated at 8,520-26 ft. It flowed 228 bbl. of 37°-gravity oil per day through 10/64-in. choke.

Standard previously had drilled one other test on the block. It was located northeast of the discovery well, and was dry at total depth of 11,671 ft.

Wolfcamp discovery finaled in Pecos

Flowing Wolfcamp Permian production was opened in eastern Pecos County, West Texas, at Phil H. Hayes 1-A University Lands. Location of the new-pay discovery is 14 miles west of Iraan in Section 9, Block 16, University Lands Survey, 2 miles west of Walker field and 2 miles north of an 8,426-ft. dry hole.

The well flowed 186 bbl. of 28.5°-gravity oil daily on potential test. Choke was 15/64-in. with perforations at 5,910-30 ft.

Jones County, Texas adds Tannehill discovery

Southeastern Jones County in West Central Texas has a new lower Tannehill sand pool at West Drilling Co. 1 S. R. Cox, Jr., 5 miles northwest of Hamby in Section 72, Block 14, T&P Survey.

The well made 39 bbl. of oil per day on pump from perforations at 1,723.5 to 1,728.5 ft. Gravity is 38°. Location is 1 mile west of Stroble Palo Pinto field and 2 miles west of Tannehill sand in Regular field. Production at the new well will be prorated to Regular field.

Texas wildcat blows out in Howard County

A Howard County wildcat in West Texas blew out last week. It is Rankin & Turner 1 Wade in the southeast part of the county.

Operators are shut down for orders after the well blew an estimated 100 bbl. in 20 minutes, thought to be from Clear Fork at 4,300 ft. Location is in Section 29, Block 31, T-1-S, T&P Survey, 8 miles southeast of Big Spring and 3¼ miles southwest of Hutto field.

Caddo conglomerate oil at Wise County well

A Wise County well in North Texas is a Caddo conglomerate discovery. It is W. W. Higgs 1 E. H. Cunningham in the northwest part of the county in Block 1, Falls County School Lands Survey, 2 miles south of Sunset.

The well flowed 160 bbl. of oil per day on 32/64-in. choke from perforations in Caddo at 5,966-80 ft. Location is 2½ miles north of Sancree field.

Texas' Calhoun gets gas-condensate well

AN EXCEPTIONALLY rich gas-condensate well has been completed by Tidewater Oil Co. in its Panther Reef field, in Calhoun County, on the Central Texas coast.

The well is rated good for 14,900 M.c.f.d. of gas, open with a liquid yield of nearly 190 bbl. per M.M.c.f. Actual ratio is 5,350 cu. ft. per bbl. Gravity of the condensate is 49°.

Shut-in pressure on the tubing is 5,503 psi. Production is from Frio sand at 9,100-20 ft. in hole drilled to 9,400 ft.

This is Tidewater's fourth well for the field, discovered in 1953. In the northeast corner of State Tract 124, it extends production more than a half mile southwestward.

The field is 2½ to 3 miles offshore in San Antonio Bay, and 10 miles south of Seadrift, base of operations.

Sparta well finaled in South Mississippi

A SPARTA sand well completed last week in the Courtland field, southeastern Adams County, South Mississippi, gives this state its third area to produce from that little-explored horizon.

The only other Sparta production in the state is one small oil well in Ellis Cliffs field, and a gas well at Stanton field. Both Ellis Cliffs and Stanton fields also are in Adams County, and like Courtland are productive from the deeper Wilcox sands.

The new Sparta discovery at Courtland is by K. B. Keary and R. N. Griffin at their 1 U.S.A., in 29-5n-1w. It is just east of Wilcox production.

Pay is perforated at 4,299½-4,301½ ft. with logs and cores showing oil saturation from 4,298 to 4,309 ft. The well flowed 44 bbl. of 29.4°-gravity oil in 24 hours through 6/64-in. choke on potential test. Flowing pressure was 1,100 psi.

Multiple completions in U. S. during January 1960

	Dual	Triple	Quadruple
Oklahoma	13	..	..
Montana	3	..	..
South Louisiana	2	..	..
Offshore Louisiana	2	1	1
Texas District 2	3	..	..
Texas District 3	1	..	..
Texas District 4	6	..	..
North Louisiana	..	1	..
West Texas	6	4	..
Texas Panhandle	1	..	..
San Juan basin (W. New Mexico)	2	..	..
Arkansas	1	..	..
Mississippi	4	..	..
East New Mexico	1	..	..
North Texas (Dist. 9)	2	..	..
California	2	..	..
Total U. S.	49	6	1
Total multiple completions	56	..	..

Discovery wells

MISSISSIPPI

Adams County:

K. B. Keary, Jr., and Ray N. Griffin 1 U.S.A., SE SE 29-5n-1w. IP 44 BOPD, 6/64-in., 29.4°, GOR 800 cu. ft. per barrel, TP 1,100 psi., perf. 4,299½-4,301½ ft., Sparta. TD 4,402 ft. Elev. 199 ft. Extension and new pay in Courtland field.

Clarke County:

J. A. Kennington-Thurber & Miller 1 H. C. Brewer et al., NW NE SW 28-1n-17e. IPP 97.5 BOPD, 19°, GOR 100 cu. ft. per barrel, TP 35 psi., perf. 3,430-72 ft., Selma chalk. TD 4,507 ft. Elev. 289 ft., Eutaw 3,965, Tuscaloosa 4,433 ft. Discovery well of West Langsdale field.

NEW MEXICO

Chaves County:

A. W. Rutter and G. L. Wilbanks 1 Amerada-State, 16 miles north of Caprock in east part of county. 20-8s-32e. IPP 30 BOPD, 70 BWPD, 25°, San Andres 4,032-69 ft. TD 4,085 ft. New oil discovery.

OHIO

Montgomery County:

Dwaine P. Moose 1 Marguerite Jenkins, Sec. 11, Butler Township, Trenton 1,070

ft. Gas at 1,127 ft. IP 160 M.c.f.d., rock pressure 310 psi. TD 1,135 ft.

NORTH TEXAS

Jack County:

Bayview Oil Corp. 3 H. C. Gilmore, 12 miles south of Graham, George Dedrick Sur. A-176. IPF 80 BOPD, 13/64-in. choke, 44°, perf. 4,198-4,206 ft. TD 4,691 ft. New oil discovery.

Wise County:

Christie, Mitchell & Mitchell 1 S. C. Kaker, 2½ miles southeast of Bridgeport, Blk. 15, Matagorda CSL Sur. A-535. IPP 12 BOPD, 43°, Atoka Penn. 5,016-20 ft. TD 6,050 ft. New oil discovery.

SOUTHWEST TEXAS

Hidalgo County:

George H. Coates and Mokeen Oil Co. 1 Dickerson-Hargrove, Share 5 of Llano Hinojosa Partition out of original Share 6, San Ramon Grant, 3 miles east of La Reforma. IP 27 BOPD (net), 33% water, 7/64-in., 46°, GOR 2,800 cu. ft. per barrel, TP 925 psi., perf. 6,327-33 ft., Frio. TD 7,476 ft. New pay in Rico field.

TEXAS GULF COAST

Cameron County:

Texaco Inc. 1 Laguna Madre State Tract 713, 7 miles northwest of Port Isabel. AOF 3,800 M.c.f.d., dry gas, shut-in TP 3,073 psi., perf. 7,556-62 ft. and 7,568-76 ft., lower Miocene. TD 8,924 ft. New-field discovery.

Chambers County:

J. P. Pekas et al. 1 Barrow, Solomon Barrow Sur., A-3, 5 miles southeast of Mount Belvieu. IP 1 M.M.c.f.d., 9/64-in., 25 BC per M.M.c.f., perf. 7,236-40 ft., Frio. TD 8,300 ft. New-pay discovery in unnamed field.

Fort Bend County:

Otis Russell and R. B. Trull 1 Farmer, Robert Hodge League, A-33, 6 miles south of Needville. AOF 13 M.M.c.f.d., GLR 333 M.c.f. per barrel, shut-in TP 2,369 psi., perf. 6,290-93 ft., Frio, and 42 M.M.c.f.d., dry gas, shut-in pressure 2,199 psi., perf. 6,183-86 ft., Frio. TD 7,188 ft. New pays in Needville field.

Hardin County:

James B. Fuller & Associates 2 Collins, M.M.S. de Casanova Sur., A-11, 4 miles northwest of Votaw. IP 160 BOPD, 11/64-in., 40°, GOR 350 cu. ft. per barrel, TP 600 psi., perf. 5,547-50 ft., Yegua. TD 6,948 ft. New pay in West Menard Creek field.

Ada Oil Co., Atlantic Refining Co., and Sinclair Oil & Gas Co. 1 Harry Himes, McKinney & Williams Sur., A-401, 3 miles southeast of Village Mills. IP 247.37 BOPD, 8/64-in., 42.8°, GOR 1,850 cu. ft. per barrel, TP 2,250 psi., perf. 9,444-51 ft., second Wilcox. TD 10,062 ft. Discovery well East Hickory Creek field.

Harris County:

Crown Central Petroleum Corp. 1 Christine Baker et al., J. Habermacher Sur., A-356, 2 miles southwest of Barker. IP 82.80 BOPD, P-31 choke, 44°, GOR 1,256 cu. ft. per barrel, TP 1,100 psi. perf. 7,220-22 ft. TD 8,100 ft. New-field discovery 2 miles north of North Clodine field.

Jackson County:

Turnbull & Zoch, Union Oil Co. of California, and Edwin L. Cox 2 Ernest Menefee et al., H. W. Munson Sur., A-57, 6 miles south of Edna. AOF 76 M.M.c.f.d., GLR 254.5 M.c.f. per barrel, 50.2°, shut-in TP 2,169 psi., perf. 5,675-86 ft., Frio, and 17 M.M.c.f.d., GLR 446.8 M.c.f. per barrel, 52.6°, shut-in 1,942 psi., perf. 5,626-30 ft., Frio. TD 7,300 ft. New pays in North Texana field.

H. H. Howell et al. 1-B Fern Lorenzen, Sec. 1, C. W. Hahl Subd., Harwood Burns Ranch, John J. Linn Sur., A-213, 5 miles south of Edna. AOF 6,300 M.c.f.d., dry gas, shut-in TP 2,508 psi., perf. 6,464-70 ft., Frio, and 3,300 M.c.f.d., dry gas, 1,708 psi., perf. 5,428-32 ft., Frio. TD 6,749 ft. New-field discovery ½ mile southwest of abandoned John Coffee field.

Jefferson County:

Meredith & Co. et al. 1 Texas Educational Association, Lot 1, Range D-2, Hiram Brown Sur., A-6, 2 miles northeast of Port Arthur. AOF 21 M.M. c.f.d., GLR 6,020 cu. ft. per barrel, 50.2°, shut-in TP 7,140 psi., perf. 11,353-39 ft., Hackberry. TD 12,309 ft. New-field discovery.

Karnes County:

Shell Oil Co. 1 Alex Dugie, Anthony Bates Sur., A-55, 7 miles northwest of Helena. IP 181 BOPD (net), 12% water, 16/64-in., 40°, GOR 1,830 cu. ft. per barrel, TP 625 psi., perf. 10,912-34 ft., lower Edwards. TD 11,041 ft. New pay in Person field.

Liberty County:

Sun Oil Co. 1 Stone, Hose Delgado Sur., A-177, 5 miles southwest of Sour Lake. IP 186 BOPD, XX-38 choke, 45.5°, GOR 1,624 cu. ft. per barrel, TP 750 psi., perf. 11,468-74 ft. TD 11,486 ft. New-field discovery.

Live Oak County:

Katz Oil Co. 1-A Slick, Sec. 297, SK&K Sur., A-515, 15 miles southwest of George West. AOF 23 M.M.c.f.d., GLR 63.6 M.c.f. per barrel, 49.6°, shut-in TP 6,793 psi., perf. 10,531-46 ft., Wilcox. TD 11,983 ft. New-field discovery.

Newton County:

Oil Reserves Corp. 1 Coline Oil Corp., Adam L. Stewart Sur., A-376, 3 miles northeast of Bon Weir. IP 280.28 BOPD, 11/64-in., 46.5°, GOR 2,210 cu. ft. per barrel, TP 1,875 psi., perf. 10,501-08 ft., Wilcox, TD 10,955 ft. New pay in Quicksand Creek field.

Nueces County:

Gulf Coast Minerals Management Corp. and Arnold Well Service Co. 1 Annie Smith, Sec. 41, SK&K Sur., A-795, 7 miles southwest of Clarkwood. AOF 16,200 M.c.f.d., 7½ BC per M.M.c.f., 52°, shut-in TP 1,258 psi., perf. 2,883-92 ft., Miocene. TD 3,050 ft. New-reservoir discovery in Shields field.

San Patricio County:

Hawn Bros. et al. 1 John E. Bushong, Sec. 23, George H. Paul Subd., J. J. Welder Ranch, 4 miles southwest of Sinton. AOF 61 M.M.c.f.d., GLR 32.3 M.c.f. per barrel, 66.5°, shut-in TP 2,585 psi., perf. 7,124-29 ft., lower Frio. TD 8,015 ft. New-field discovery.

Victoria County:

Bobby M. Burns 1 Frank Otto et al., Sec. 41, Richey Land Co. Subd., Roseborough Ranch, V. Garcia Grant, A-45, 5 miles southeast of Inez. IP 83 BOPD, ¼-in., 44°, GOR 2,340 cu. ft. per barrel, TP 160 psi., perf. 5,838-40 ft., lower Frio. TD 6,615 ft. New pay in Witte field.

TEXAS PANHANDLE

Hutchinson County:

Amarillo Oil Co. 1 Bivins "C," Sec. 13, Galveston-Brazos & Colorado Narrow Gage Surv. IPCAOF: 1,600 M.c.f.d., Red Cave Permian 1,570-1,634 ft. TD 1,750 ft. Geological wildcat discovery inside Panhandle field.

(More wildcats on page 179)

MUD REMOVAL?

MUDBAN

Mudban* is a Dowell product used to help remove mud cake and excess drilling mud from wells; and to help remove mud lost to producing formations. It is added to the oil used in well clean-out work. Mudban is effective on almost all types of muds. It is a non-acid mud dispersing agent. Mudban is low-cost too. Be ready. Keep a can of Mudban on hand. Available in 10-gallon steel drums from all Dowell stations.

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Products for the oil industry

DOWELL

DIVISION OF THE DOW CHEMICAL COMPANY

DIAL DOWELL

Dr. Ben H. Parker . . . Predicts brighter future for geologists.

Adversity Can Be Advantage

• That's been the experience of Dr. Ben Parker, educator, geologist, and newly elected president of the AAPG.

ADVERSITY is not always as it seems at first; for it guided Dr. Ben H. Parker toward a career as a noted educator as well as a successful practicing geologist.

Twice, prior to and during the depression of the early 1930's, Parker found himself out of a geology job when his oil-company employers entered a period of retrenchment.

"Each time, looking back, I feel I gained personally," says the 57-year-old oil executive. "It was painful at the moment. But I was forced to use my abilities at the utmost, and I think I advanced myself each time."

In 1932, 8 years after he had received his diploma as an engineer of mines, geology major, from the Colorado School of Mines, Parker returned to his alma mater at Golden on the theory he might as well take advantage of the adverse job situation to further his formal education. It was a wise decision.

He served as an instructor in geology for 4 years, during which time he received his doctorate. Since then, Parker has devoted his efforts to education and working as a practicing geologist.

Parker became president of the Colorado School of Mines in 1946. He served in that capacity until 1950.

Today, he is a director and vice president of Frontier Refining Co., Denver, chairman of the board of trustees for the Colorado School of Mines, and newly elected president of the American Association of Petroleum Geologists.

AAPG duties . . . Parker will assume the office of AAPG president in April, during the group's annual meeting at Atlantic City. He takes over leadership of the 15,600-member organization when there are more geologists than jobs, but he is optimistic about the future of the profession.

As Parker puts it:

"There is a limited excess supply of professionally trained geologists as measured by the demand. This is not the first time this situation has occurred. To the man out of work, the conditions look blue. But conditions changed before, and I'm confident they will this time."

Parker believes the job situation will take care of itself, that the number of unemployed is small relative to the number of geologists, and that there still is opportunity for well qualified geologists.

"The better qualified men will be the ones who maintain their positions," he says, "and the best qualified among the unemployed will get jobs first. Actually, the situation tends to upgrade the profession because it gives everyone an urge to improve his background and training. I am not extremely alarmed, considering the long-range situation. The number of unemployed in the field of geology will decrease rather than increase."

Parker says the AAPG has not made an official study of the possibility of registration of geologists. He believes it is not a national issue for AAPG.

He points out, however, that AAPG recently raised its qualifications for junior membership, and that the group's membership committee probably will recommend in April that full membership requirements be stiffened.

Oklahoman . . . Parker was born in Oklahoma City, the son of a hard-

▶▶▶ Personals

David M. Galerston and **George J. Abraham** have been named reservoir engineers for Atlantic Refining Co. in Midland, Tex.

Charles H. Dobbs, district geologist for Cities Service Oil Co., has been transferred to Bartlesville, Okla., from Olney, Ill. **V. L. Nations,** district land man, has been transferred to Tyler, Tex., from Olney.

Edward F. Murray, Jr., seismologist with Superior Oil Co. of Venezuela in Caracas, has been transferred to Oklahoma City as review seismologist for Superior Oil Co.

Joseph H. Wallis, Jr., staff engineer in the crude area of Tidewater Oil Co.'s Delaware City, Del., refinery, has been appointed analyst in economic planning. **James D. Moneymaker,** formerly staff engineer in the utilities section, has been appointed staff engineer, crude area. **Dudley R. Arculus,** engineer in the technology section, will move to the utilities and sulfur recovery area as staff engineer.

E. S. (Johnny) Walker, executive secretary of New Mexico's new Oil and Gas Accounting Commission, has resigned to run for state land commissioner on the Democratic ticket in the spring primary. **Carroll Lee,** assistant director, has been named acting director of the commission.

ware store proprietor. His father homesteaded 160 acres during the Oklahoma land run in 1889. The Oklahoma City oil field later included part of the Parker homestead.

Young Ben Parker attended Oklahoma City's Central High School. In 1924, he received his college diploma.

During the next 8 years, before he returned to Colorado Mines as student and teacher, Parker was a geologist for Marland Oil Co. and Gypsy Oil Co. In 1935, he returned to field work for 2 years as geologist for Gulf Oil Corp., on leave of absence from the college.

He used another leave of absence to work in Argentina as assistant chief geologist for Argentine Government Oilfields.

Since 1942, Parker has been a vice president of Frontier Refining Co. He was made a director in 1951. He keeps his hand in the field of education also, as director of the Colorado School of Mines Research Foundation and chairman of the college's trustees.

At Frontier, Parker directs exploration and production. Frontier has oil and gas production in Kansas, Colorado, Nebraska, New Mexico, Utah, Wyoming, and Saskatchewan.

Views . . . As president of AAPG, Parker expresses his idea on the organization's function:

"One of the most important functions of any professional organization is for the elevation of the professional standing of its members and the acceptance of its members by the public as professional people. I feel AAPG can render a service to its members and to the public by making this one of its principal objectives.

"I hope we can accomplish, by renewed efforts, an increase in the training and experience required for membership in the association; and encourage the members to maintain education beyond undergraduate and graduate academic days—to continue their studies even after formal academic training."

Carl W. Virgin, market development engineer with Enjay Co., Inc., has been named marketing coordinator, plastics.

Henry V. Howe, director of the school of geology, Louisiana State University, has been named recipient of the Sidney Powers Memorial medal of American Association of Petroleum Geologists. The award recognizes outstanding contributions to petroleum geology. It will be formally presented at AAPG's annual meeting April 26 in Atlantic City, N. J.

Robert Abercrombie, petroleum engineer for Mobil Oil Co. in Natchez, Miss., has been transferred to Shreveport, La., as exploitation engineer.

Warren A. Warner, formerly gas engineer in Wharton, Tex., for Magnolia Petroleum Co., has been transferred to Kilgore, Tex., as petroleum engineer for Mobil Oil Co.

Russell D. Bonney, sales district manager in Holyoke, Mass., for Sun Oil Co., has been named manager of the Portland, Me., sales district. Bonney succeeds **Howard G. Carlson,** who is on special assignment in the company's Long Island City, N. Y., district.

Paul H. Richard, automotive liaison representative of Du Pont Co.'s petroleum chemicals division in Detroit, has been named head of a new automotive division in the company's petroleum laboratory. **Max W. Corzilius,** research engineer in the petroleum laboratory, will succeed Richard.

Harvey H. Ward, field drilling superintendent of Arrow Drilling Co., Ltd., has been appointed vice president and manager of operations. **Peter Kovsher,** office manager, has been named secretary and treasurer. Ward has been with the company since 1947, Kovsher, since 1952.

D. S. Harvie has been appointed general manager of Canadian Fina Oil, Ltd. In other appointments, **J. E. Baugh** has been named manager of production operations; **W. L. Clemis,** manager of exploration; and **M. G. Capen,** manager of exploration operations. **J. E. Lambert** has been named manager of administration. **R. C. McCallum** has been named treasurer.

Kenneth E. Kalen, superintendent of compressor stations for Panhandle Eastern Pipe Line Co., has been named assistant to the vice president in charge of gathering and transmission. **G. J. Gillian,** assistant superintendent of compressor stations, moves up to succeed Kalen. **C. J. Witt,** maintenance engineer in Kansas City, will succeed Gillian. **Charles B. Amick,** succeeds Witt. **Ralph Hilbig,** formerly superintendent of the Tuscola, Ill., compressor station, will succeed Amick as superintendent of region 4 in Crawfordsville, Ind. **James H. Budden, Jr.,** assistant superintendent at Tuscola, has been named plant superintendent there. **Lee S. LaDow,** assistant superintendent of the Houstonia, Mo., station, has been named plant superintendent in Glenarm, Ill. He succeeds **Millard M. McElvain,** who recently retired.

▶▶▶ Personals

S. P. Shouldice has been named Pembina area engineer for Pan American Petroleum Corp.

Dr. David N. Burdge has joined Ohio Oil Co.'s Littleton, Colo., research center as research chemist.

James A. Eanes has been appointed lubrication engineer in charge of technical service in the lube-oil sales section of Monsanto Chemical Co.'s Lion Oil Division. Eanes was with Arkansas Fuel Oil Corp. before joining Lion Oil recently.

W. F. Eiting, Jr., assistant production manager for Humble Oil & Refining Co.'s Carter Division, has been named eastern area manager for the division. He will headquarter in Mattoon, Ill. Eiting succeeds **R. P. Ryan,** who recently was named general counsel and a member of the Carter division board of management. **R. E. Hammond,** production manager of eastern area operations in Mattoon, will succeed Eiting in Tulsa. Eiting has been with Carter since 1936. He was production manager in Mattoon before moving to the Tulsa post in 1955.

EITING

James E. Coleman, vice president and general manager of Manufacturers Light & Heat Co., Pittsburgh, has been elected president of the Pennsylvania Natural Gas Men's Association. He succeeds **D. B. Beecher,** president of Equitable Gas Co., Pittsburgh. Other new officers are **R. L. Ehrman,** T. W. Phillips Gas & Oil Co., vice president; and **P. L. Kesel,** Carnegie Natural Gas Co., secretary-treasurer. **J. B. Sayers,** Peoples Natural Gas Co., has been elected a director.

Robert L. Stover, Anderson-Prichard Oil Corp., Great Bend, Kans., has been elected chairman of the Great Bend section of AIME's Society of Petroleum Engineers. Other officers are **E. B. Krider,** National Cooperative Refinery Association, first vice chairman; **John E. McLeland,** Petroleum, Inc., second vice chairman; and **Gordon Jones,** Rice Engineering & Operating, Inc., secretary - treasurer. New directors include **Peter Blanda,** Kewanee Oil Co.; **Dwayne E. Godsey,** Tennessee Gas Transmission Co.; and **W. B. Huebner,** Continental Oil Co.

Personals

David L. Campbell, senior vice president of British American Oil Co., Ltd., has been elected executive vice president. **Clarence D. Shepard** has been named vice president and a director and will continue as general counsel. Campbell has been with B-A since 1934. He has been superintendent of the Calgary refinery, manager of refineries, manager of manufacturing, and vice president-manufacturing. He became senior vice president in 1957. Shepard was chief commissioner of the Board of Transport Commissioners before joining the company last year.

CAMPBELL

C. E. Chiasson, chief mechanical engineer at the Bronte, Ont., refinery of Cities Service Refining (Canada), Ltd., has been named superintendent of offsite facilities. **Leo Maziak,** chief chemist, has been appointed acting assistant area superintendent, offsite facilities. **Blake Stewart,** general engineer, has been promoted to chief general engineer.

W. A. Findlay, division exploration representative in San Francisco for California Exploration Co., has been appointed senior staff geologist, exploration, in The California Co.'s western region, Denver. The companies are subsidiaries of Standard Oil Co. of California.

William H. Magill, product technologist in Amoco Chemicals Corp.'s petroleum additives division, has been appointed administrative assistant to the general manager of marketing. Sales territory formerly handled by Magill will be taken over by **John B. Lavezzorio,** sales engineer, petroleum additives.

Dr. R. W. Brauchli, vice president in charge of exploration for Anderson-Prichard Oil Corp., has been named vice president for exploration and production. Exploration and production activities have been combined into one department by the company following recent retirement of **Weston (Buck) Payne,** vice president in charge of production. Brauchli was with Pure Oil Co. before joining Anderson-Prichard in 1926. He was named manager of exploration in 1937 and has been vice president, exploration, since 1947.

E. J. Dickinson, reserve and evaluation engineer with Pan American Petroleum Corp., has retired after 3½ years with Pan Am and predecessor companies.

F. M. Pyzel, director of Foster Wheeler Corp.'s process development department, and **E. F. Wentworth, Jr.,** general attorney in charge of the legal department, have been elected vice presidents of the company.

Travis L. Gordy, formerly in Continental Oil Co.'s technical service division, Houston, has been transferred to Ponca City, Okla., and promoted to research group leader in the petroleum products research division.

Richard L. Borgan, research engineer for Gulf Research & Development Co. in Harmarville, Pa., has been transferred to Western Gulf Oil Co. as petroleum engineer in Bakersfield, Calif.

John R. Lewis, formerly proration engineer with Pan American Petroleum Corp. in Oklahoma City, has joined the staff of Mid-Continent Oil and Gas Association's Washington office.

Daniel C. Paxton, formerly junior plant engineer at Mobil Oil Co.'s Pegasus gasoline plant, Midland, Tex., has joined C. F. Braun & Co. in Alhambra, Calif., as mechanical engineer.

George C. Brooks, sales representative in the Chicago district of Amoco Chemicals Corp., has been appointed a product supervisor in the marketing department. **Herbert D. Holdridge, Jr.,** administrative assistant to the general manager of marketing, will succeed Brooks in Chicago.

William H. Quay, manager of Atlantic Refining Co.'s eastern Pennsylvania marketing region in Reading, Pa., has been transferred to Philadelphia as manager of a new central marketing region. The new region combines Philadelphia and eastern Pennsylvania regional operations. **John L. McAndrews** will continue as Reading district manager. Others moving from the Reading region to Philadelphia include **James J. Conway,** sales manager; **Louis R. Souder,** operations manager; and **Edward Sickels,** accounting and credit manager. **Pierce MacNair,** retail heating-oil manager in the Philadelphia district, has been named wholesale sales manager in the central region. **George R. Tracy** will be real estate manager for the new region.

L. D. McClure, junior chemist for DX Sunray Oil Co., has been promoted to chemist in Tulsa.

James J. McMahon, formerly with Shell Oil Co., has joined Northern Natural Gas Co. in Omaha as senior reserves engineer. McMahon was representative for Shell on Seeligson unitization in Corpus Christi, Tex., at one time.

Harvey Rowe, general sales manager for Cities Service Oil Co., Ltd., has been appointed assistant to the vice president for marketing. **A. J. Irvine,** Toronto district manager for the company, has been named general sales manager.

Arthur Holden, general superintendent, refining, at the Pointe-a-Pierre, Trinidad, refinery of Texaco Trinidad, Inc., has been named assistant to the vice president in charge of Trinidad operations in the New York offices of Texaco Inc. Holden joined Trinidad Leaseholds, Ltd., now Texaco Trinidad, in 1948. He was superintendent, catalytic cracking unit, and assistant refinery superintendent at Pointe-a-Pierre before becoming general superintendent, refining, in 1957.

HOLDEN

Stewart Chodosh, chemist in the Bayway refinery laboratories of Humble Oil & Refining Co.'s Esso Standard Division, Linden, N. J., has been promoted to senior chemist there. Chodosh has been with the company since 1957.

Leonard A. Brandon and **Erwin F. Pesek,** geologists with Sunray Mid-Continent Oil Co., have been appointed senior geologists in Oklahoma City. **Gene C. Sigler,** junior geologist, has been named geologist in Shreveport, La. **John B. Dorsey,** junior engineer in Corpus Christi, Tex., has been promoted to engineer and transferred to Midland, Tex.

Dr. P. E. Kent, senior British Petroleum Co. geologist with service in Iran, Papua, East Africa, United Kingdom, and Canada, has been named president of BP Exploration Co. (Alaska), Inc., which will start an exploration program in Alaska this summer. **Tad Hillyward,** formerly in charge of the Calgary office of Triad Oil Co., Ltd., will be in charge of the Anchorage, Alaska, office.

Sam H. Lloyd has been elected a vice president of Blue Water Drilling Corp. He will continue as manager of Gulf Coast offshore drilling operations for the company. Lloyd has been with Blue Water since 1957. The company is owned by Austral Oil Co., Crescent Drilling Co., Mississippi River Fuel Corp., and Olin Oil & Gas Corp.

M. J. Templeton, assistant to the president and Houston representative for Southern Minerals Corp., has been elected a vice president. Templeton joined the company in 1947 as a drilling crew chief. He has been in Houston since 1957.

Elmer L. DeMaris, manager of petroleum engineering in General Petroleum Corp.'s production department before merger of General Petroleum and Mobil Oil Co., has retired after 36 years with General Petroleum. He will become a consultant specializing in property appraisals.

John J. Winterbottom, vice president and a director of Esso Standard Division of Humble Oil & Refining Co., has retired after 43 years with Standard Oil Co. (N. J.) and its affiliates. Winterbottom headed Jersey Standard's transportation coordination department before moving to Esso Standard.

G. E. Zimmer, formerly process division general foreman at the Sugar Creek, Mo., refinery of Standard Oil Co. (Ind.), has been named superintendent of operations at the company's Mandan, N. D., refinery. He succeeds **L. H. Huth,** who recently was named manager of operations for Amoco Chemicals Corp., a subsidiary.

Kermit G. Rowley, petroleum engineer in Morgan City, La., for Mobil Oil Co., has been transferred to Pettus, Tex., as area engineer.

W. L. Durr, geologist with Continental Oil Co., has been transferred to Hamilton, Ohio, from Richmond, Ind.

R. E. Griswold, staff geologist in New York for Texaco Inc., has been appointed assistant to the Dallas division manager, domestic producing department. Griswold has been with Texaco since 1949 and had held the New York post since 1958. His new appointment is effective March 1.

Karl M. Buehler, formerly geological consultant in Denver, has been appointed Canadian operations manager for Katex Oil Co., Borger, Tex., independent firm. Buehler will headquarter in the company's new Calgary office.

D. E. Grosskurth, formerly assistant superintendent of the Bakersfield, Calif., district, domestic producing department of Texaco Inc., has been named superintendent of materials and supply in the Los Angeles division. He succeeds **G. C. Pilkington,** who has retired.

Charles F. Miller has been appointed manager of foreign production and drilling operations for Kerr-McGee Oil Industries, Inc. In other changes in Kermac's production and drilling operations division, **Kenneth W. Parker** has been named project superintendent, Bolivian operations; **Burrell G. Taylor,** has been named manager of the production department; and **Harry C. Hanna** has been named general superintendent of the production department. **John I. Fisher,** superintendent of gas contracts, has been named superintendent of gas contracts and production engineering.

▶▶▶ Personals

William C. Trimble has been named drilling engineer with Gustavson Drilling Co., Ltd. Trimble was formerly with Texaco Exploration Co.

Charles L. Novy, engineer trainee with Atlantic Refining Co., has been promoted to junior reservoir engineer and transferred to Oklahoma City from Lafayette, La.

Dr. Howard L. Malakoff, manager of the development department of Petroleum Chemicals, Inc., has been elected vice president and general manager of Cities Service Research & Development Co. He succeeds **Lee N. Haugen,** who has been named vice president and general manager of Cities Service Athabasca, Inc. Malakoff joined Cities Service Oil Co. in 1943 as a chemical engineer. He had been with Cities Service Research and Cities Service Petroleum, Inc., before moving to Petroleum Chemicals in 1956. Petroleum Chemicals is jointly owned by Cities Service and Continental Oil Co.

MALAKOFF

George J. McLeod, formerly with Canadian Devonian Petroleums, Ltd., in Regina, has joined Samedan Oil of Canada, Inc., as Canadian division geologist. He will be in charge of all geological work for the company.

Frank T. Allen, head of the seismic interpretation section in Gulf Research & Development Co.'s Harmarville, Pa., laboratory, has been named geophysical supervisor of Libya and Turkey for Gulf Eastern Co. He will headquarter in Tripoli, Libya.

▶▶▶ Deaths

Charles Frederick Bevan, 67, retired production manager in Arabian American Oil Co.'s Abqaiq field, died February 5 at his home in Los Angeles. Bevan was a general superintendent for Standard Oil Co. of California in the Taft, Calif., and Kettleman Hills areas before moving to Aramco in 1946. He retired in 1953.

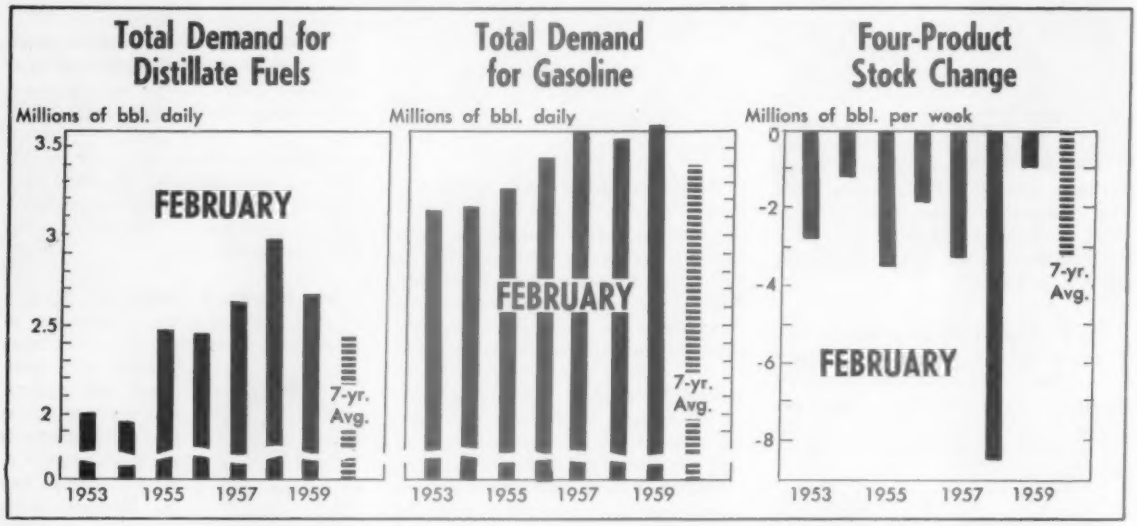
James Walter Kearney, 64, retired superintendent of Warren Petroleum Corp.'s Hawkins, Tex., natural-gasoline plant, died February 4 in a Sapulpa, Okla., hospital. Kearney had been with Warren since 1922. He retired last year.

Jarrett B. Loar, 79, retired Gulf Oil Corp. superintendent, died February 2 in a Sapulpa, Okla., hospital. Loar retired in 1946.

Ralph W. Davis, president of Ralph W. Davis & Co., Chicago investment firm, and a director of Seismograph Service Corp. since 1946, died January 31 in Chicago.

C. L. Fleming, 79, retired director and vice president in charge of refining and marketing operations for Ohio Oil Co., died February 8 in Findlay, Ohio, after a heart attack. Fleming joined Ohio Oil in 1898. He retired in 1945.

William Ernst Bates, 61, crude-oil representative in Midland, Tex., for Texaco Inc., died February 3 in Midland after a brief illness. Bates joined Texaco in 1921 in Houston. He had been in Midland since 1947.



Compare stock drop with 7-year average

BY JOHN C. CASPER

DON'T JUDGE petroleum demand for a given month by a single comparison with the same month of the previous year, particularly during the winter season. Comparisons are valid only if corrections are made for changes in the weather. Weather influences demand for fuels but it also has some effect on sales of gasoline.

Take a look at the first chart in the above series. The bars represent total demand for distillate fuel in February of each year since 1953. There have been decreases in three of these years.

The all-time February peak for distillate demand was in 1958. The total was just short of 3,000,000 bbl. daily. There were two cold months in 1958, February and December. Low temperatures in these months tended to distort comparisons with the same months of 1957 and 1959. Also, distillate demand for February 1957 was atypical because of export shipments during the Suez crisis.

For the past 7 years, February distillate demand has averaged about 2,450,000 bbl. daily. If temperatures this month average about normal, total distillate demand will be slightly less than 2,800,000 bbl. daily. But the absence of real winter weather in the early part of the month will have to be balanced by some low temperatures in the last half to bring distillate demand up to normal.

The same bad weather which promotes sales of heating oils also tends to reduce sales of gasoline. Note that part of the big gain in distillate demand for February 1958 was offset by a decrease in total demand for gasoline.

Unless snow clogs more highways this month than normally, domestic demand for gasoline will average about 3,750,000 bbl. daily. This total will set an all-time February record.

Stocks of the four major products drop during the month of February. Since the amount of decline depends on refinery production as well as demand, there is more year-to-year variation in stock change than in total demand. Note on the third chart that the drop in four major product stocks for 1958 was about 8.5 million barrels per week.

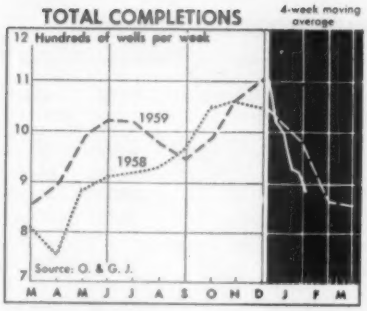
The decline in major-product stocks for February last year was less than 1.0 million barrels per week. This should serve as a warning when making year-to-year stock comparisons over the month. If stocks seem to be improving, compared with 1959, it will be due in part to poor stock reductions a year ago. Major product stocks should drop at least 3.0 million barrels per week.

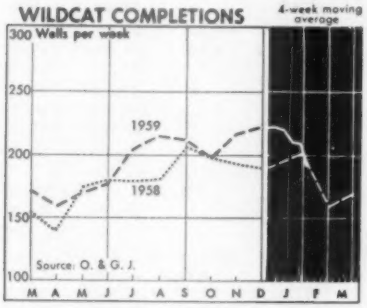
A quick look at the highlights . . .

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	7,329,425	UP	187,955	UP	119,660
Crude stocks	248,777,000	UP	69,000	DOWN	10,893,000
Completions	776	DOWN	44	DOWN	76
Refinery runs	8,199,000	UP	50,000	UP	174,000
Gasoline stocks	206,418,000	UP	3,234,000	UP	7,510,000
Kerosine stocks	24,288,000	DOWN	737,000	UP	3,639,000
Distillate stocks	121,521,000	DOWN	4,964,000	UP	29,503,000
Residual stocks	47,673,000	DOWN	256,000	DOWN	8,151,000
Four-product stocks	399,900,000	DOWN	2,723,000	UP	32,501,000
Total imports	2,044,300	DOWN	134,300	UP	153,600

FEBRUARY STOCK CHANGES
(Thousands of barrels per week)

	Gaso.	Kero.	Dist.	Resid.
1953	1,841	— 739	—3,427	—433
1954	2,062	— 458	—2,664	— 89
1955	3,020	—1,244	—4,352	—854
1956	2,942	— 627	—3,574	—621
1957	1,892	— 752	—3,867	—551
1958	2,204	—1,468	—8,617	—617
1959	2,823	— 341	—3,195	—259
7 yr. avg.	2,398	— 804	—4,242	—489





Active Rotary Rigs

	2-8-60	2-1-60	2-9-59
Alabama	4	4	8
Arkansas	11	13	13
Arizona	0	0	0
California	59	69	70
Land	53	64	67
Offshore	6	5	3
Colorado	26	27	26
Florida	1	2	1
Land	0	1	1
Offshore	1	1	..
Illinois	17	24	24
Indiana	5	7	4
Iowa	2	1	3
Kansas	112	117	131
Kentucky	9	10	5
Louisiana	304	288	297
North	34	35	31
S. Inland waters	115	113	128
S. Land	98	89	101
Offshore	57	51	37
Maryland	0	0	1
Michigan	34	35	17
Mississippi	72	72	52
Missouri	1	1	0
Montana	8	10	16
Nebraska	17	19	21
Nevada	0	0	0
New Mexico	89	96	97
New York	0	0	0
North Dakota	22	19	28
Ohio	2	2	2
Oklahoma	185	177	202
Oregon	0	0	0
Pennsylvania	11	11	11
South Dakota	2	3	1
Texas	597	611	685
S. Inland waters	7	6	8
S. Land	162	173	129
Offshore	0	0	2
North-East	141	133	162
West Central	205	211	250
West	82	88	134
Utah	26	28	28
Washington	1	1	1
West Virginia	3	3	2
Wyoming	58	60	49
Total U. S.	**1,678**	1,710	1,795
Western Canada	235	240	222
Eastern Canada	4	4	0
Grand total	1,917	1,954	2,017

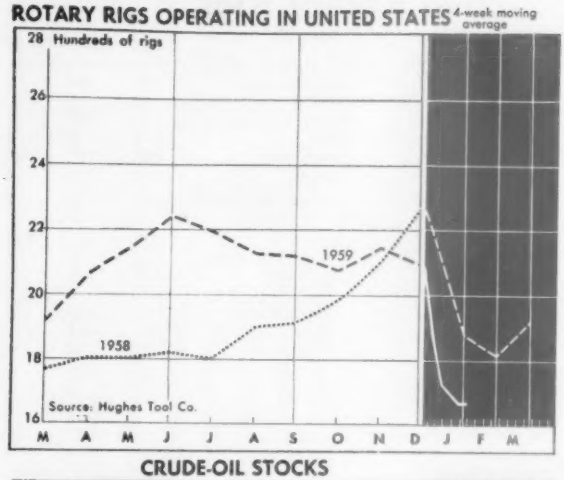
Hughes Tool Co. report.

WEEKLY WELL COMPLETIONS . . . WEEK ENDED FEBRUARY 6, 1960

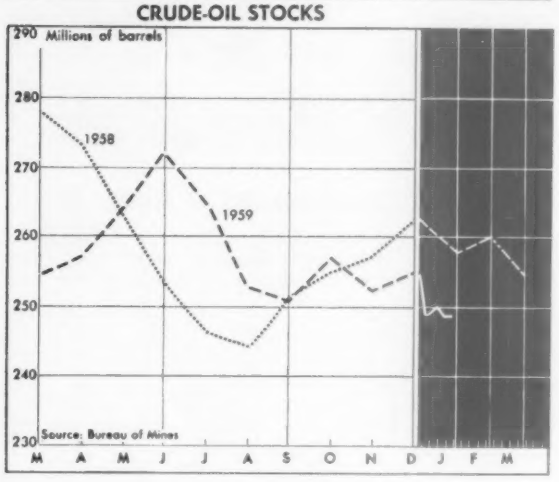
	Total wells							Cum.		Total wildcats					Cum.	
	Total	Crude	Cond.	Gas	Dry	Service	Footage	1960	1959	Total	Crude	Cond.	Gas	Dry	1960	1959
Alabama	3	2	0	0	1	0	25,618	8	17	1	0	0	0	1	1	2
Arizona	0	0	0	0	0	0	0	5	.....	0	0	0	0	0	5	.....
Arkansas	9	4	0	0	5	0	30,482	61	113	2	1	0	0	1	16	24
California	18	13	0	1	4	0	83,639	153	183	2	0	0	0	2	36	45
Colorado	18	2	0	1	15	0	81,353	83	84	9	0	0	0	9	43	44
Illinois	46	20	0	0	26	0	90,444	259	280	15	1	0	0	14	67	46
Indiana	19	9	0	0	10	0	29,843	109	75	6	0	0	0	6	36	22
Kansas	69	20	0	7	40	2	257,123	379	484	27	5	0	3	19	123	117
Kentucky	44	19	0	18	7	0	93,418	253	165	1	0	0	0	1	26	14
Louisiana	56	21	7	9	18	1	371,846	379	417	5	1	1	0	3	49	67
North	25	11	0	8	6	0	69,729	135	152	2	0	0	0	2	21	34
South	25	8	7	1	9	0	250,652	186	223	2	1	1	0	0	26	32
Offshore	6	2	0	0	3	1	51,465	58	42	1	0	0	0	1	2	1
Michigan	21	6	0	1	14	0	71,578	87	63	5	0	0	0	5	29	20
Mississippi	11	7	0	0	4	0	105,437	80	87	6	2	0	0	4	30	45
Montana	4	4	0	0	0	0	23,437	36	34	3	3	0	0	0	19	9
Nebraska	10	6	0	0	4	0	63,853	78	72	3	0	0	0	3	28	31
New Mexico	36	19	2	9	6	0	168,724	226	183	5	0	0	0	5	33	20
West	15	4	2	9	0	0	71,940	82	.....	0	0	0	0	0	6	.....
East	21	15	0	0	6	0	96,784	144	.....	5	0	0	0	5	27	.....
New York	25	13	0	1	5	6	40,638	50	52	3	0	0	1	2	5	1
North Dakota	7	5	0	0	2	0	44,505	34	49	1	0	0	0	1	6	12
Ohio	15	3	0	3	9	0	43,260	141	85	4	0	0	1	3	8	2
Oklahoma	75	38	0	17	20	0	356,769	421	591	10	2	0	0	8	84	109
Pennsylvania	0	0	0	0	0	0	0	6	0	0	0	0	0	0	2	0
South Dakota	2	2	0	0	0	0	17,337	4	.....	0	0	0	0	0	2	.....
Texas	267	143	9	15	88	12	1,105,609	1,883	2,204	42	2	0	2	38	380	426
District 1	16	11	0	0	5	0	36,866	134	168	3	0	0	0	3	48	42
District 2	11	3	0	5	3	0	71,877	80	99	2	0	0	0	2	20	31
District 3	21	6	2	1	11	1	152,633	168	132	6	0	0	0	6	32	42
District 4	21	5	6	0	10	0	130,092	174	160	8	1	0	0	7	47	48
East	25	14	1	0	7	3	79,928	162	125	1	1	0	0	0	36	31
District 7-B	36	16	0	3	17	0	108,445	234	273	9	0	0	2	7	68	81
West	63	48	0	1	13	1	288,991	522	694	5	0	0	0	5	67	75
District 9	51	25	0	2	17	7	132,410	310	393	6	0	0	0	6	55	61
District 10	23	15	0	3	5	0	104,367	99	160	2	0	0	0	2	7	15
Utah	6	5	0	1	0	0	34,265	31	36	2	1	0	1	0	13	10
West Virginia	0	0	0	0	0	0	0	62	82	0	0	0	0	0	1	2
Wyoming	15	8	0	0	6	1	65,762	107	95	4	0	0	0	4	47	39
Miscellaneous	0	0	0	0	0	0	0	12	11	0	0	0	0	0	11	8
Total U. S.	**776**	369	18	83	284	22	3,204,940	4,947	5,462	**156**	18	1	8	129	1,100	1,115
Prev. week	820	380	22	87	313	18	3,642,890	.....	.....	180	15	2	8	155	.....	.....
Cum. 1960	4,947	2,329	179	409	1,896	134	21,585,009	.....	.....	1,100	97	13	34	956	.....	.....
Cum. 1959	5,462	2,748	147	331	2,094	142	23,328,447	.....	.....	1,115	108	15	40	952	.....	.....
Western Canada	60	41	0	3	16	0	318,040	207	225	19	4	0	1	14	57	75

PRODUCTION

ROTARY RIGS OPERATING IN UNITED STATES



CRUDE-OIL STOCKS



CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

	1-30-60	1-23-60	1-31-59
Pennsylvania	2,250	2,287	2,539
Other Appalachian	1,956	2,058	1,597
Illinois, Indiana, Michigan	9,603	9,426	9,675
Nebraska and North Dakota	2,801	2,690	2,132
Kansas	9,131	9,324	9,450
Oklahoma	16,789	16,574	16,551
Arkansas	2,183	2,139	1,956
Louisiana	18,831	18,094	16,948
North	3,226	3,072	3,062
South	15,605	15,022	13,886
Mississippi, Alabama, Florida	2,487	2,571	2,482
New Mexico	7,392	7,693	8,823
Texas	106,501	107,261	115,938
East Texas	7,964	8,015	8,814
West Texas	50,068	49,924	57,132
Texas Gulf	19,026	19,937	19,622
Other Texas	29,443	29,385	30,370
Wyoming	17,365	17,269	13,469
Other Rocky Mountain	9,128	9,243	9,575
California	28,246	28,261	34,485
Foreign	†14,114	13,818	14,050
Total	248,777	248,708	259,670

*Bureau of Mines. †Includes 3,912,000 bbl. in California.

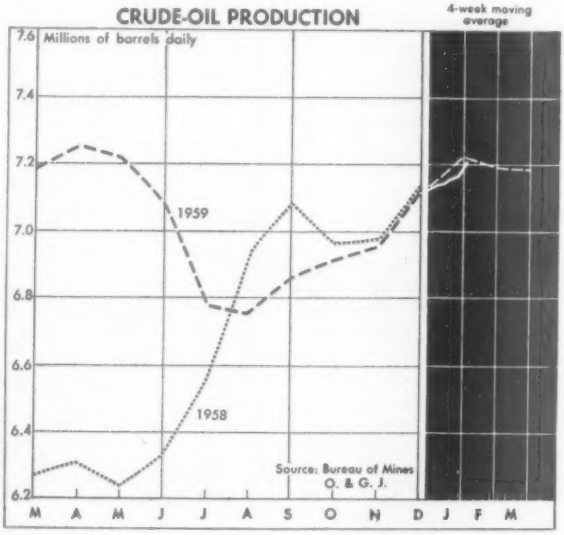
DAILY AVERAGE PRODUCTION FOR WEEK

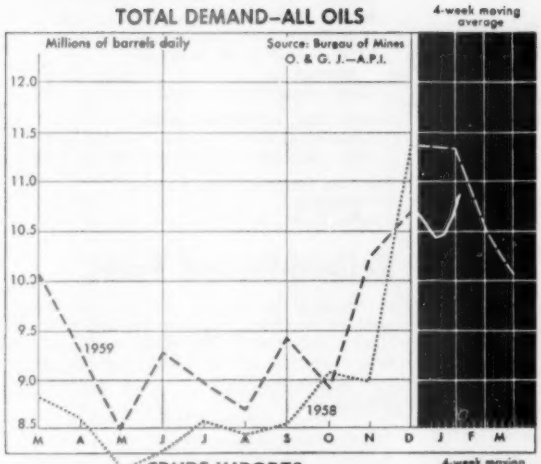
	February 6, 1960			Jan. 30
	Crude oil	Lease condensate	Total	total
Alabama	19,150	.....	19,150	19,130
Arkansas	79,800	250	80,050	80,330
California	830,900	.....	830,900	836,700
Colorado	129,500	.....	129,500	128,400
Eastern	40,100	.....	40,100	42,400
Florida	1,175	.....	1,175	1,150
Illinois	219,900	.....	219,900	217,300
Indiana	32,600	.....	32,600	32,700
Kansas	†328,550	.....	†328,550	†288,390
Kentucky	67,400	.....	67,400	67,900
Louisiana	953,875	132,500	1,086,375	1,071,450
North	108,150	6,000	114,150	113,950
South	845,725	126,500	972,225	957,500
Michigan	35,000	.....	35,100	33,100
Mississippi	141,150	5,025	146,175	146,720
Montana	80,500	.....	80,500	81,100
Nebraska	63,400	.....	63,400	63,100
Nevada	100	.....	100	100
New Mexico	296,375	6,700	303,075	299,400
North Dakota	59,700	.....	59,700	60,100
Oklahoma	†581,800	.....	†581,800	†550,300
Texas	2,671,150	90,225	2,761,375	2,665,000
Dist. 1	40,725	3,800	44,525	43,000
Dist. 2	117,000	9,200	126,200	120,900
Dist. 3	350,725	38,500	389,225	377,000
Dist. 4	186,850	15,800	202,650	187,800
Dist. 5	27,000	500	27,500	27,400
Dist. 6	145,575	.....	145,575	120,400
East Texas field	116,725	9,400	126,125	142,000
Dist. 7-B	137,850	200	138,050	135,180
Dist. 7-C	128,000	3,625	131,625	126,620
Dist. 8	1,120,425	5,600	1,126,025	1,079,200
Dist. 9	192,275	2,200	194,475	195,100
Dist. 10	108,000	1,400	109,400	109,400
Utah	110,600	.....	110,600	108,900
Wyoming	350,900	.....	350,900	346,800
Others	‡1,000	.....	‡1,000	‡1,000
Total U. S.	7,094,725	234,700	**7,329,425**	7,141,470
Change from prev. week, up			**187,955**	
Canada	†620,300	.....	†620,300	†609,800

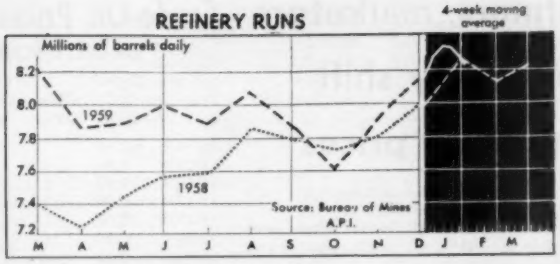
Total U. S. prod., January 1-February 6 ..... 266,213,200 bbl.
Same period last year (crude plus cond.) ..... *267,184,620 bbl.

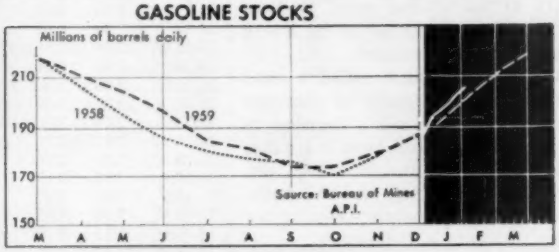
*Includes 7,469,800 bbl. condensate. †Week ended previous Monday. ‡Alaska and South Dakota.

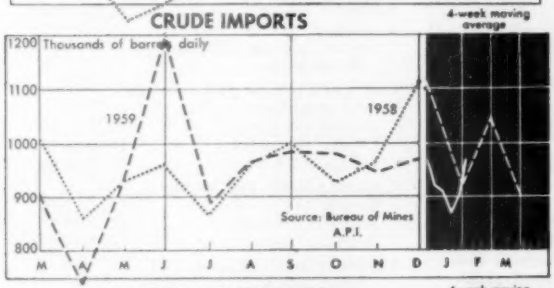
CRUDE-OIL PRODUCTION

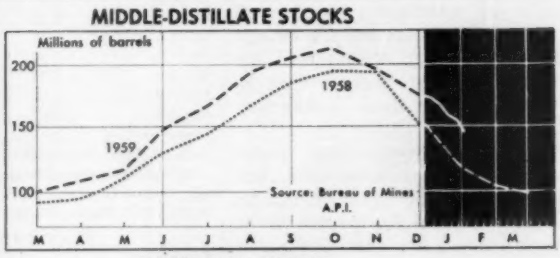


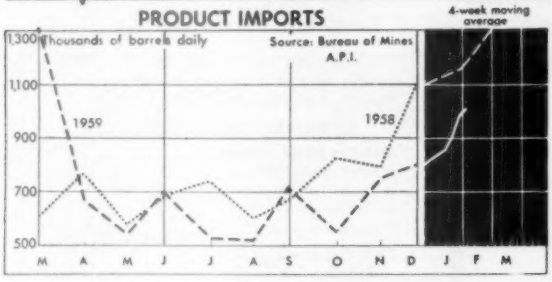

TOTAL DEMAND—ALL OILS
4-week moving average
Millions of barrels daily
Source: Bureau of Mines
O. & G. J.—A.P.I.
1959
1958
M A M J J A S O N D J F M

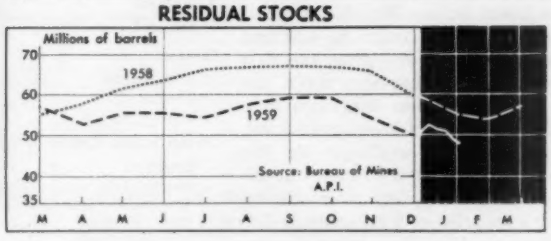












API REFINERY REPORT—FEBRUARY 5, 1960

(Thousands of barrels)

District—	Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.	Stocks‡ Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, February 1959 Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.
East Coast	1,100	502.4	31.6	345.7	171.3	41,614	10,649	45,264	12,488	1,223	562.0	50.8	437.5	217.9
Appalachian:														
District 1	93	37.6	3.7	21.1	15.3	5,928	610	3,192	315	101	41.2	6.6	24.1	13.0
District 2	107	54.0	8.4	17.7	16.6	2,990	410	1,374	371	115	55.9	9.9	21.9	17.1
Ind., Ill., Ky.	1,496	773.1	62.6	361.1	210.4	37,425	4,891	20,638	5,006	1,505	714.3	81.3	381.6	234.0
Minn., Wis., Dak.	122	60.1	6.9	23.1	18.4	7,227	952	5,529	644	104	52.1	5.8	26.1	12.9
Okla., Kans., Mo.	746	425.7	15.4	196.6	30.2	20,413	970	10,008	1,010	778	419.4	16.9	225.5	38.8
Inland Texas	293	210.1	10.6	47.9	23.1	8,071	393	1,413	2,425	290	196.2	8.9	51.0	22.3
Texas Gulf Coast	1,998	1,009.0	126.0	503.2	166.7	27,369	2,290	12,505	5,055	1,775	807.9	139.4	517.1	183.3
La. Gulf Coast	686	347.1	55.3	154.3	54.3	12,444	1,744	5,013	1,179	716	351.5	78.4	189.3	52.5
N. La. and Ark.	109	41.9	7.4	21.4	9.9	5,588	715	2,663	185	106	51.1	6.9	24.0	6.4
Rocky Mountain:														
New Mexico	27	15.1	.71	5.3	3.0	905	59	159	114	25	12.4	0.7	4.4	2.5
Other Rky. Mt.	295	142.1	4.3	72.9	33.4	6,870	189	2,391	1,082	293	136.9	4.6	61.5	38.4
West Coast	1,127	531.6	5.4	186.3	338.0	29,574	416	11,372	17,799	1,096	538.1	7.2	195.1	285.7
Feb. 5, 1960	8,199	4,150.0	338.3	1,956.6	1,090.6	206,418	24,288	121,521	47,673	8,127	3,939.0	417.4	2,159.1	1,124.8
Jan. 29, 1960	8,149	3,938.6	346.9	1,938.6	983.4	203,184	25,025	126,485	47,929	.....	.....	.....	.....	.....
Feb. 6, 1959	8,025	3,844.7	414.7	2,144.1	965.9	198,908	20,649	92,018	55,824	.....	.....	.....	.....	.....

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

Refiners, marketers make early shift in product prices

DESPITE the cold wave that was sweeping across a large section of the country in the second week of February, marketers seemed to be losing interest in distillate fuels.

On the other hand, refiners have taken a look at reports of distillate inventories and reached a decision to move light heating oils even if it takes a price cut to do it. In doing this, they are disregarding a well-established economic principle: Demand for heating distillate is inelastic.

Heating-oil sales are a function of the number of burners and the weather. The homeowner doesn't turn up his thermostat just because fuel is 0.25 cent cheaper than it was last week.

The supplier knows that lower prices will not increase demand, but he may feel that he has a chance to work off a part of his surplus stock if he can catch a few extra customers with a lower price. But, his competitors will know how much he sold and the price within a day after the first delivery. Other suppliers meet the price and distribution continues in a normal pattern but a lower price level.

No. 2 fuel is available on the Group 3 market at 8.75 cents a gallon, but a few suppliers were still reporting spot sales at 9.00 cents as late as February 10. The break in the Group 3 market followed a reduction in the Gulf Coast cargo price a full week earlier.

Lower prices on distillate moving out of the Mid-Continent area were offset by another slight improvement in gasoline prices. Group 3 regular gasoline is selling for 10.25 cents to unbranded jobbers. A few small-volume jobbers may be paying 10.50 cents. Even this higher price would have been considered low back in November when gasoline prices were dropping rapidly. Also, the current price for 91-octane regular is 1.35 cents a gallon lower than the average of lows of quotations for 1957, and gasoline quality did not reach 89 octane until the middle of that year.

Gasoline is selling at near price-war levels in the general Los Angeles area. Mobil Oil Co. has reduced the minimum fair-trade retail price for gasoline in Pennsylvania. The cut was 1.0 cent a gallon.

Crude-Oil Prices

GRAVITY SCHEDULE

	Signal Hill, Calif.	Oklahoma	Gulf Coast Tex.*	West Tex.† N.M.	Wyo. (sour)
14-14.9	$1.76	....	....	....	....
15-15.9	1.84	....	....	....	$1.81
16-16.9	1.92	....	....	....	1.86
17-17.9	2.00	....	....	....	1.91
18-18.9	2.08	....	....	....	1.96
19-19.9	2.16	....	....	....	2.01
20-20.9	2.24	$2.49	....	$2.35	2.06
21-21.9	2.32	2.52	....	2.38	2.11
22-22.9	2.39	2.55	....	2.41	2.16
23-23.9	2.46	2.58	$3.44	2.44	2.21
24-24.9	2.53	2.61	3.46	2.47	2.26
25-25.9	2.60	2.64	3.48	2.50	2.31
26-26.9	2.67	2.67	3.50	2.53	2.36
27-27.9	2.74	2.70	3.52	2.56	2.49
28-28.9	2.81	2.73	3.54	2.59	2.54
29-29.9	2.87	2.76	3.56	2.62	2.59
30-30.9	2.93	2.79	....	2.65	2.63
31-31.9	3.00	2.82	....	2.68	2.67
32-32.9	3.06	2.85	....	2.71	2.71
33-33.9	3.12	2.88	....	2.74	2.75
34-34.9	3.17	2.91	....	2.77	2.79
35-35.9	3.22	2.94	....	2.80	2.83
36-36.9	3.27	2.97	....	2.83	2.87
37-37.9	3.31	2.99	....	2.86	2.89
38-38.9	....	3.01	....	2.89	2.91
39-39.9	....	3.03	....	2.92	2.93
40-40.9	....	3.05	....	2.95	2.95

*Low cold test crude. †Sour.

Effective dates of broad changes: California, 9-11-59; East of California, January 3-10, 1957; Pennsylvania Grade 1-11-60.

FLAT PRICES

Louisiana:	
Sweet Lake	$3.00
Texas:	
East Texas	3.05-3.25
Conroe	3.23-3.53
Van	3.08
Pennsylvania Grade:	
Bradford	4.55
Middle District	4.37
Southwest Pennsylvania	4.10
West Virginia	3.92
Buckeye Grade	3.97
Illinois Basin	**3.00**

FOREIGN

Canada:	
Leduc-Woodben	2.53
Redwater (Alta.)	2.42
Smiley (Sask.)	2.18
Pembina	2.38
Venezuela:	
Cumarebo, 48°-9°, Tucupido	3.34
San Joaquin, 41°-41.9°, Puerto La Cruz	3.08-3.10
Oficina, 35°-35.9°, Puerto La Cruz.	2.80
Tia Juana medium, 26°-26.9°, Amuay*	2.30
Quiriquire, 16.0°-16.4°, Caripito	2.10
Lagunillas heavy, flat, Las Piedras*	2.10
Bachaquero, flat, 15°-16°, Las Piedras*	1.88

Prices for all crudes of 24° or lighter vary 2 cents per degree change, up or down. All crudes heavier than 24° vary 2.5 cents per half-degree gravity change.

*Also available at La Salina at 3 cents per barrel less.

Middle East, Persian Gulf (cargoes f.o.b. lifting port):	
Arabian, about 34°, Ras Tanura	$1.89
Iranian, 34.0°-34.9°, Bandar Masur	1.80
Iranian, 34.0°-34.9°, Abadan	1.81
Iraq, 36.0°-36.9°, Fao	1.82
Kuwait, 31.0°-31.9°, Mina-al-Ahmadi	1.67
Qatar, about 41°, Um Said	2.05
Middle East, E. Mediterranean:	
Arabian, about 35°, Sidon	2.29
Iraq, about 35°, Tripoli, Banias	2.29
Far East (cargoes, f.o.b. Lutong, Sarawak):	
Seria Light, 37°	2.57

Refined-Product Prices

Following quotations are for refinery products in cents per gallon moving in interstate shipments on Wednesday each week unless otherwise noted. Crude-oil prices are per barrel at the wells unless otherwise listed.

GASOLINE*

Mid-Continent (Group 3):	
★Regular (91 octane)	10.25-10.50
★Premium (99 octane)	12.75-13.25
Natural gasoline (26-70)	4.5
Breckenridge	4.0
Gulf Coast (cargoes for coastwise or export movements):	
Regular (90 octane)	10.25-10.50
Regular (92 octane)	10.50-10.75
Premium (98 octane)	11.75-12.00
California (rack) Los Angeles):	
Regular (88 octane)	11.65-12.15
Premium (94 octane)	12.65-13.15
Premium (100 octane)	14.00-14.65
Caribbean area (cargoes):	
Regular (87 octane)	10.125
Premium (97 octane)	11.75

*Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.

KEROSINE AND DISTILLATE

Mid-Continent (Group 3):	
★Kerosine 42-44	9.75-10.00
★Diesel oil (58 d.i. and above)	9.50- 9.75
★Distillate No. 1	9.50- 9.75
★Distillate No. 2	8.75- 9.00
Gulf Coast (cargoes):	
Kerosine 41-43	9.50
Distillate No. 2	8.375
New York Harbor (barges):	
Kerosine 41-43	11.10
Distillate No. 2	10.1
Diesel fuel, 48-52 d.i.	10.40
Caribbean area (cargoes):	
★Distillate No. 2	8.375

RESIDUAL FUEL (BBL.)

Mid-Continent (Group 3):	
Residual fuel (max. 1% S)	$1.80-1.90
Gulf Coast (cargoes):	
Bunker C fuel	$2.00
New York Harbor (barges):	
Bunker C fuel	$2.37
Caribbean (cargoes):	
Bunker C	$2.00
California (rack):	
Bunker C fuel, Los Angeles	$2.15

Tanker Rates (Long Ton)

(Latest reported spot figures)

★Carib.-NY, clean (ATRS—18%)	$2.26
★Carib.-NY, dirty (ATRS—57.5%)	1.17
★Carib.-UK, dirty (Scale—51.25%) (15s. 10d.)	2.22
PG-Japan, dirty (USNC—65%)	3.57

★Denotes change from previous week.

(Continued from page 169)

WESTERN CANADA

Alberta:

Kewanee 4-5 Inverness, LSD 4, 5-69-10w5. Beaverhill Lake oil discovery. TD 8,245 ft.

Imperial 4-22 Judy Creek, LSD 4, 22-64-11w5. Beaverhill Lake oil discovery. TD 8,929 ft.

Cities Service et al. 16-17 Pembina, LSD 16, 17-50-8w5. Cardium sand oil discovery. TD 4,760 ft.

Cities Service et al. 1-12 Spruce Grove, LSD 1, 12-52-27w4. D1 zone oil discovery. TD 6,555 ft.

Canadian Seaboard et al. 10-5 Bison, LSD 10, 5-95-15w5. Devonian gas discovery. TD 5,553 ft.

CALIFORNIA

Kings County:

Beach, Church and Bell 1-25 South Lake Farms, NW NE 25-23s-21e, 50 M.c.f.d., perfs. 904-5 ft., TD 2,900 ft. (New gas-pool discovery in the Trico-Northwest area).

SOUTHWEST TEXAS

Jim Wells County:

Rand Morgan 9-R Fee, Sec. 5, Ragland Farm Tracts, 5 miles southeast of Orange Grove. IP 77 BOPD, X-27 choke, 39.9°, GOR 421 cu. ft. per barrel, 1,020 psi., perf. 5,285-90 ft., Frio. TD 5,750 ft. New pay in Rand Morgan field.

Starr County:

Consolidated Petroleum Industries et al. 1 Epiqmenio Pedraza et al., Tract 214, Porcion 90, 14 miles northeast of Rio Grande City. IP 81 BOPD, 12/64-in., 46°, GOR 1,460 cu. ft. per barrel, TP 435 psi., perf. 3,363-71 ft., Frio. TD 4,025 ft. New-field discovery.

Walker Corp. 1 Margo-Gutierrez Trustee, Carmargo Jurisdiction, Porcion 95, 9 miles northwest of Sullivan City. AOF 6 M.M.c.f.d., GLR 157 M.c.f. per barrel, 63.7°, shut-in TP 1,164 psi., perf. 3,836½-42½ ft. TD 6,510 ft. New reservoir in Garcia field.

Webb County:

Grande Oil Co. 1 J. C. Martin Trustee, Tule & Reyna Pastures, Share 2, J. Borrego Grant. IPP 22 BOPD, 20°, GOR 80 cu. ft. per barrel, perf. 949-53 ft. TD 958 ft. New reservoir in Retamia area.

Zapata County:

Crecent Oil & Gas Corp. 1 F. H. Fosa, Porcion 23, Share 15, 20 miles southast of Zapata. Shut-in gas-condensate well, no gage, perf. 7,796-7,802 ft., Wilcox. TD 10,186 ft. Extension and new pay in Lopena area.

Zavala County:

General Crude Oil Co. 1 Kinast, Sec. 21, Blk. A, AB&M Sur., A-52, 10 miles south of Batesville. IP 25 BOPD, 16/64-in., 28°, TP 75 psi., perf. 4,402-12 ft., San Miguel. TD 4,710 ft. New-field discovery.

TEXAS GULF COAST

Willacy County:

William G. Gill and R. W. Sullivan 1 Chess and Robert Todd, Lot 5, Blk. 1, Narcisco Tract No. 4, 2 miles northeast of La Sara. IP 100 BOPD, $\frac{3}{16}$-in., 29.4°, GOR 400 cu. ft. per barrel, 230 psi., perf. 3,488-93 ft. TD 7,050 ft. New pay in La Sara field.

WEST CENTRAL TEXAS

Palo Pinto County:

G. E. Dadane & Sons 1 R. H. Smith, 2½ miles south of Graford in north-central part of county. Sec. 1774, TE&L Sur. IPCAOF: 2,500 M.c.f.d., Pennsylvanian 4,230-40 ft. TD 4,886 ft. New gas discovery.

Parker County:

R. K. Neilson 4 Ella Gilbert, 15 miles southwest of Weatherford in southwest part of county. Jacob Johnson Sur. A-741. IPF: 16,600 M.c.f.d., Caddo conglomerate 3,185-95 ft. TD 4,424 ft. New gas discovery.

Stephens County:

L. B. Hamilton, Jr. 1 Marston, 18.5 miles southeast of Breckenridge, southeast part of county. Guadalupe CSL Sur. A-64. IPF 92 BOPD, 12/64-in. choke, 42.4°, conglomerate 3,465-75 ft. TD 3,490 ft. New oil discovery.

WEST TEXAS

Kent County: Tres Oil Co. 1 Wallace et al, Sec. 32, Blk. L, H&TC Sur. IPF 162 BOPD, 18/64-in. choke, 37.6°, Strawn 6,419-44 ft. TD 7,075 ft. New oil discovery.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Denver, Colorado. Notice is hereby given that 107.99 acres of land in two parcels within the known geologic structure of McCallum Field, Jackson County, Colorado, will be offered for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre, at 2 p.m., M.S.T., April 22, 1960, when bids will be opened. Details of the lease offering, how and where to submit bids, and forms, may be obtained from the Bureau's Land Office, P. O. Box 1018, Denver, Colorado. Dale R. Andrus, Land Office Manager.

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FOR SALE EQUIPMENT

NEW—USED equipment: Valves, flanges, (screw and welded) fittings—300 DP subs, bolted tanks—WFR Rental Sales, Inc., Box 156, Scott, La., Phone CE 4-2762, Lafayette, La.

NEW Spencer-Harris portable rig, 2,000' to 6,000' with 3½ DP, complete, liberal discount. (Rig will go 7,000' with 3" N80 tubing and tool joints). R. M. Pair, 532 Chilton Tyler, Tex. Phone LY 4-4833.

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CARDWELL MODEL K-200 double-drum unit powered by GZBU 145 Waukesha. 65 ft. telescopic poles with racking board. McKissick 2-sheave blocks, Mission deep well slips, elevators, and other tools included. Bought new and run one year. Call Joe Hodges Well Service, OVerland 3-2703, Bridgeport, Texas.

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1—BREWSTER MODEL OB-18 Oilbath Rotary and list of additional equipment, used 360 hours. Location New York. Box L-691, The Oil and Gas Journal, Tulsa, Oklahoma.

WELL DRILLS—CORE DRILLS. Everything for well and core drilling in both new and used equipment at money saving prices. Fishing tools rented. Send for bulletins. Pressey & Son, Pueblo, Colo.

1—36-L BUCYRUS ERIE spudder, trailer mounted, less tools. Price $7,000.00. Woodford Supply Company, P. O. Box 84, Phone CE 5-1454, Oklahoma City 1.

1—ALDRICH 3½" x 7" Triplex salt water pump, with Lufkin gear reducer and 100 HP electric motor. Capacity 6,000 bbl. per day, 820 lbs. pressure. Price $3,500.00. Woodford Supply Company, P. O. Box 84, Phone CE 5-1454, Oklahoma City 1.

NATIONAL "50" Rotary rig. Complete with 96' Lee C. Moore mast, 2 Waukesha "NK" motors, 7¼ x 14 Wheland pump, 6,000' of 4½" drill pipe. Cash, or will trade for production or producing equipment. L. B. Jackson Company, Box 717, Sapulpa, Oklahoma.

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2 COMPLETE UNIT rigs for sale U-15 drawworks. 1 rig is powered by 3 NKU Waukesha engines. 1 rig powered by 2 LRO Waukesha engines. Drill pipe and collars optional. Rigs may be seen at Henson Drilling Company yard in Abilene, Texas. Complete inventory on request.

FOR SALE OR LEASE: Three (3) large perforating trucks complete with 16,000' of 7/16" single conductor line. These units are ready for the field. Box L-614, The Oil and Gas Journal, Tulsa, Oklahoma.

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TWO WALKER-NEER Spudders: One Model S 43, capacity to 3,500 ft. 5" and 6" tools complete. 3,500-ft. sand line; 3,750-ft. drilling line. One Model C 34, capacity to 7,500 ft. 5" tools complete. 6,200-ft. sand line and 8,000-ft. drilling line. One mounted on GMC 2-ton truck and one on International 6 x 6, 3-ton truck. Two dog houses, three light plants, and one ½-ton Chevrolet pickup. Others accessories. E. E. Reed, Box 306, Satanta, Kans.

EQUIPMENT WANTED

WANTED—FAILING 2500 Rotary, complete with 2⅜ or 2⅞ Drill string. Must be in A-1 condition. Not more than 4 years old. Diesel. Send complete description and inventory and low price. Melvin Wilson, Box 96, Towanda, Kansas.

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CHEMICAL ENGINEER

We have an opening for a Chemical Engineer with 1-5 years refining experience—an opportunity to learn the application of refinery problems to a computer. No computer experience necessary. Initiative, alertness, and a demonstrable aptitude for learning this or similar type work is required. We are experienced in applying problems on medium sized and large sized rental computers. Have a medium size computer on order. Send resume to:

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Box L-704
The Oil and Gas Journal
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Heavy Chemical Producer has desirable opening for graduate chemical, metallurgical or mechanical engineer to supervise inspection section of large engineering department. Eight to ten years experience of actual field inspection of plant equipment in chemical, petroleum or related industry required. Please submit resume with present salary, with first letter. All replies confidential.

Box L-712
The Oil and Gas Journal
Tulsa, Oklahoma

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Oil Company has immediate need for two qualified men with chemical and or mechanical engineering degree. Require at least five years experience in all phases of natural gasoline plant operation and treatment of sour gas. Duties involve general plant engineering including laboratory control testing, plant performance tests and plant maintenance. Experience as supertindent of natural gasoline plant operations also highly desirable.

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Tulsa, Oklahoma

SITUATIONS WANTED

PETROLEUM ENGINEER: B.S., 33, married; 8 years experience. Waterflood evaluation, design, installation, and operation. Primary completion and operations. Box L-717, The Oil and Gas Journal, Tulsa, Oklahoma.

REGISTERED ENGINEER—10 years experience, design and development, oil and gas production equipment, and gasoline plants; desires research and development position. P. O. Box 7423, Dallas 9, Texas.

PETROLEUM ENGINEER—Age 29. Total 5 years drilling, production and reservoir experience; 1½ years in South America. Desires foreign employment. Box L-721, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOPHYSICIST—Thirteen years diversified domestic, foreign experience. Excellent references. Box L-688, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST-GEOPHYSICIST, 31, presently employed. 6½ years experience, major oil company. All phases seismic exploration. Box L-687, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION MANAGER—Married, twenty years experience in the drilling and completions of oil and gas wells. Will relocate and consider foreign service. Box L-705, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST: 32, 10 years on and offshore Gulf Coast, Texas, Louisiana and Ark-La-Tex experience including sub-surface, seismic, stratigraphic, evaluation, checking and finding deals. Wide range of contacts. Box L-661, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER, desires position with independent producer. Presently with major, 2½ years diversified experience. Box L-686, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER, 26, married. BS in petroleum engineering and geology—4½ years experience in production, reservoir engineering, drilling, well completions and workovers. Desires position with consulting or banking firm. Presently employed. Box L-580, The Oil and Gas Journal, Tulsa, Oklahoma.

PIPELINE ENGINEER—age 36 returning to States for childrens' education. Five years domestic experience natural-gas pipelines and seven years foreign oil pipelines and tanker terminals. Experienced in administration and supervision plus all phases design, construction, operation and maintenance. Box L-700, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATION WANTED

PETROLEUM GEOLOGIST—married, age 28, B.S. degree, with four years experience in South America in operation and exploration phases of geology, plus training in petroleum engineering desires position in the U.S. preferably in the Permian Basin. Box L-720, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER, 31, married, 7 years production, unitization, and waterflood experience in Louisiana, Texas, Arkansas, and Mississippi; desires position with chance for advancement. Box L-714, The Oil and Gas Journal, Tulsa, Oklahoma.

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INDEPENDENT COMPANY has large British Columbia petroleum and natural gas permits, to farm out. Adjacent to Major company holdings. Will consider any reasonable deal. Box L-711, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE— up to ½ interest in 80 acres to Barrtlesville Sand, 750 ft. depth. Proven territory. Montgomery County, Kansas. Box L-722, The Oil and Gas Journal, Tulsa, Okla.

50 ACRES Eastern Kansas. Diagonal offset Bartlesville Sand 700 ft. Need help on drilling. Reply: Box L-718, The Oil and Gas Journal, Tulsa, Oklahoma.

KENTUCKY—Will lease my 200, 206 and 240 acres lying on Dale Hollow Lake, Cumberland County, about six miles Southwest of Clinton County Gusher. Write or call: Ira Theobald, Louisville, Ill. Phone NOrth 5-3703.

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KENTUCKY—600-acre lease on Willis Creek along Cumberland-Clinton County. Border near many Granville Sand producing wells. Price $10.00 per acre, ⅛ override. Wire or phone, W. V. Cravens, % Alpine Motel, Burkesville, Kentucky.

KENTUCKY— 4,000 acres western Pulaski County, 1,000 acres Russell County, 600 acres southern Casey County, 1,200 acres Monroe County. Price $5.50 per acre, ⅛ override. Box L-693, The Oil and Gas Journal, Tulsa, Oklahoma.

OIL AND GAS MINERAL LEASES available in Dell City area of Hudspeth County, Texas. U. S. Geological Survey Map shows anticlinal axis nearby favorable for oil-gas structure. Am fee landowner of over 2,000 acres. Write quickly to: Jefferson G. Smith, 715 Littlefield Building, Austin 15, Texas.

WANTED—N.E. Oklahoma or Eastern Kansas leases with waterflood possibilities, shallow, with or without production. Send production history, core data, all information first letter. Box L-702, The Oil land Gas Journal, Tulsa, Oklahoma.

FOR SALE or drilling interest: Arizona oil and gas leases (Federal), Coconino County, 640 acres T17N, R13E, 586 acres T17N, R14E. Write: Box L-708, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: Oil and gas leases in Shelby County, Texas. 106 acres, new 10 year term lease; also 171 acres, both in excellent locations. Price $3.50 per acre. Write for information to C. A. Parker, Box 507, Center, Texas.

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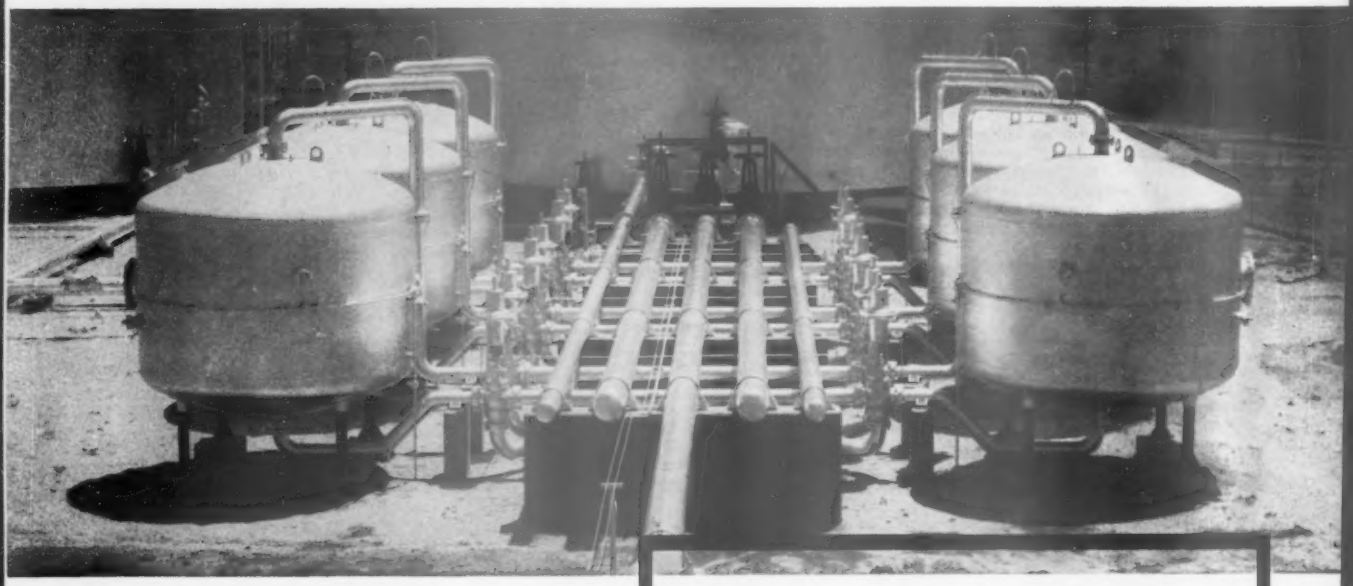

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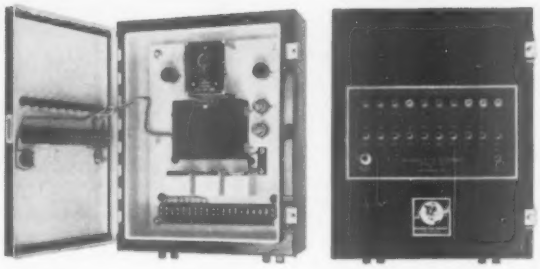

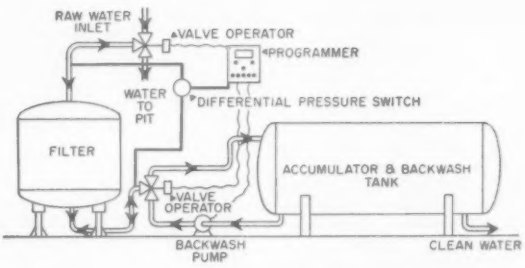

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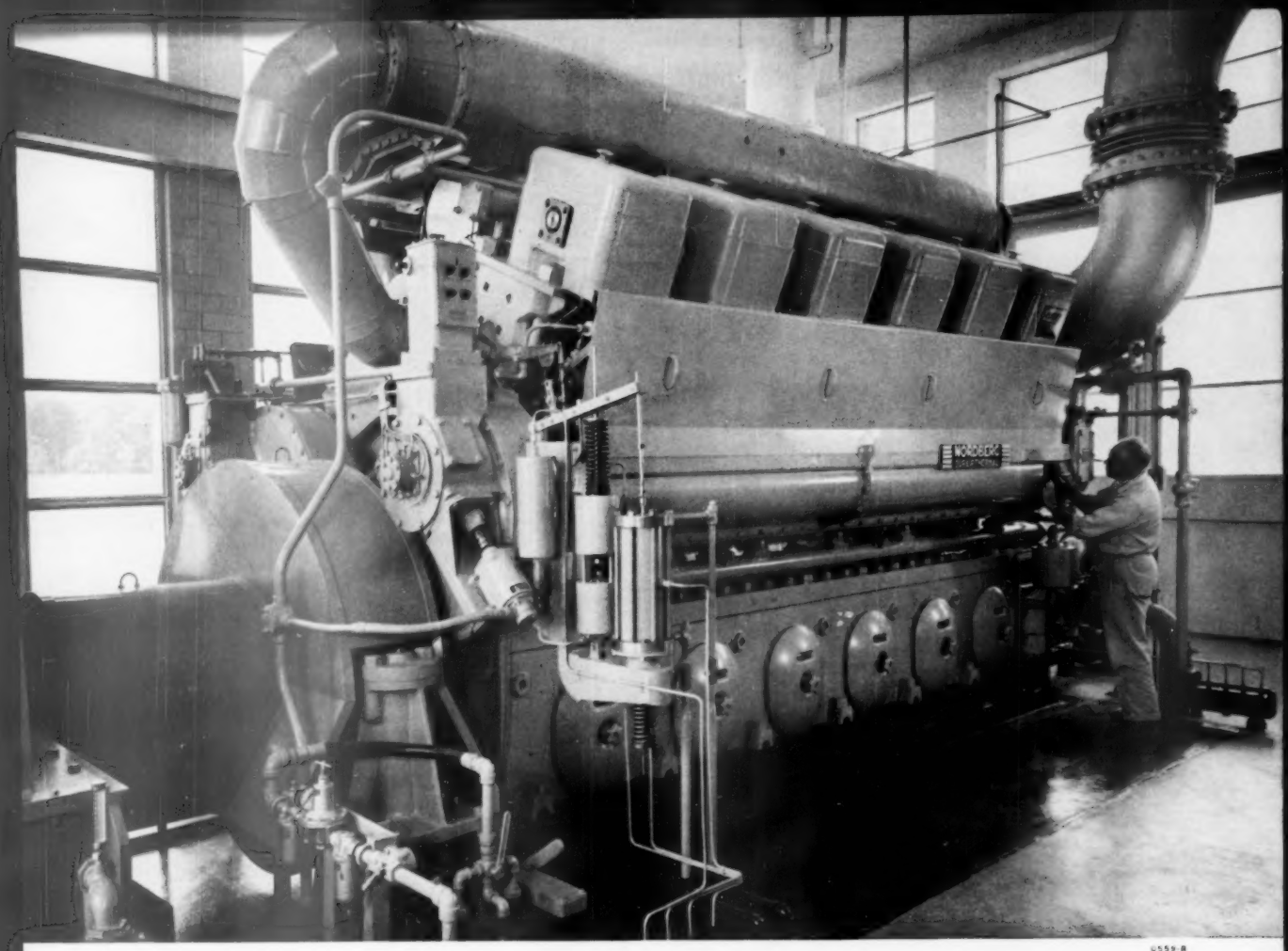

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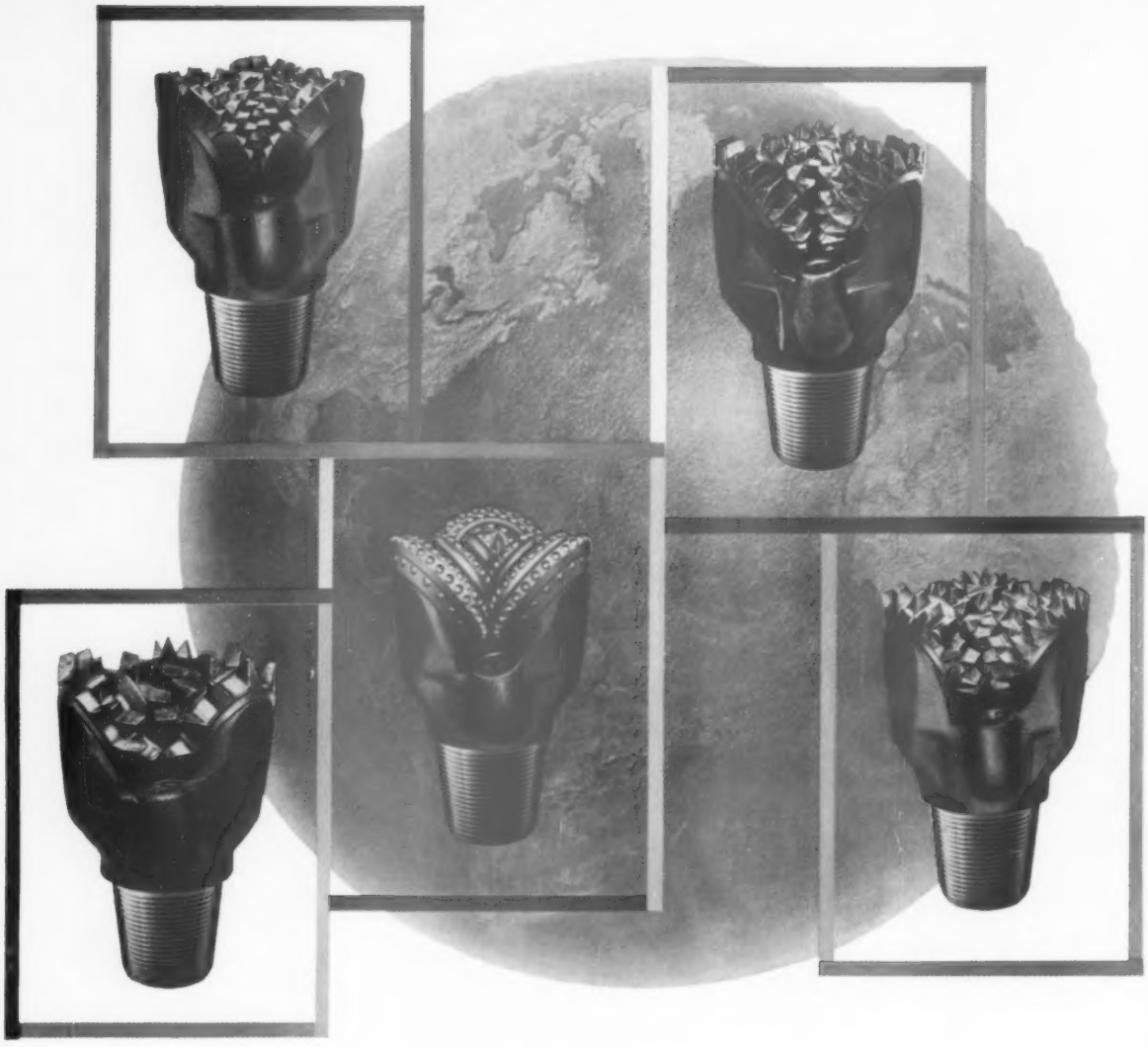

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